# APPENDIX A
# INTERAGENCY AND INTERGOVERNMENTAL AGENCY COORDINATION AND CONSULTATION LETTERS AND RESPONSES

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# Appendix A-1

## Joint Base-Pearl Harbor Hickam and Pacific Missile Range Facility-Barking Sands

# Appendix A-1.1

# Stakeholder Mailing List

**Native Hawaiian Organizations**

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Mr. Steven Nagano
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Senator Mazie Hirono
Senator, Hawaii
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Senator Brian Schatz
Senator, Hawaii
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# Appendix A-1.2

# Sample National Historic Preservation Act Section 106 Letters

**HAWAII AIR NATIONAL GUARD**
**HEADQUARTERS 154th WING**

JAN 29 2021

Headquarters, 154th Wing
Brigadier General Dann S. Carlson
360 Mamala Bay Drive, Bldg 3400B
JBPHH HI 96853-5517

Jerome Yasuhara
Office of Hawaiian Affairs
560 N. Nimitz Hwy, Suite 200
Honolulu, HI 96817

Dear Mr. Yasuhara,

The purpose of this letter is twofold: to give you an opportunity to review and comment on a proposed action in which the Office of Hawaiian Affairs may have an interest; and to invite the Office of Hawaiian Affairs to participate in coordination with the National Guard Bureau (NGB) at Joint Base Andrews, Maryland, pursuant to Section 106 of the National Historic Preservation Act.

Pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321 et seq.), the NGB is preparing an Environmental Assessment (EA) for a proposed undertaking that will analyze potential effects to human health and the natural environment, including historic and traditional cultural properties. The undertaking includes completing two Air National Guard (ANG) Space Control Squadron (SPCS) basing actions, SPCS #4 and SPCS #5 at:

- Pacific Missile Range Facility (PMRF) – Barking Sands, HIANG 154th Wing (154 WG), located at Kauai, Hawai'i (HI) (Attachment 1);
- Joint Base Pearl Harbor – Hickam (JBPHH), HIANG 154 WG, located at Honolulu, Oahu, HI (Attachment 2); or
- Andersen Air Force Base (AFB), Guam ANG (GUANG), 254th Wing (254 WG), located on Guam (Attachment 3).

The purpose of the undertaking is for the United States Air Force (USAF) to provide the facilities and locations suitable for the establishment of two ANG locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. The proposed sites for the proposed undertaking are depicted on Attachments 1, 2, and 3. A Class I Literature Review has been performed for each of the three alternative locations; the findings of the Class I Literature Review are included in Attachment 4.

Pursuant to Section 106 of the NHPA, implementing regulations at 36 Code of Federal Regulations (CFR) Part 800, and Department of Defense Instruction 4710.02 Section 6, *DoD Interactions with Federally-Recognized Tribes*, we request consultation with the Office of Hawaiian Affairs on this proposed action. In particular, we invite you, pursuant to 36 CFR Section 800.4(a)(4), to provide information on any properties of historic, religious, or cultural significance that may be affected by our proposed undertaking. Regardless of whether you choose to consult on this project, the USAF will comply with the Native American Graves Protection and Repatriation Act by informing you of any inadvertent discovery of archaeological or human remains and consulting on their disposition. Being defined as a federal undertaking, we will be seeking input and inviting other potential consulting parties, such as the HI State Historic Preservation Division.

We intend to provide your organization with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your agency other than you should receive the Draft EA.

In order for the NGB to address any concerns in a timely manner, please respond within 30 days of receipt of this letter. Please provide any comments to Jennifer Harty, Cultural Resources Program Manager, 3501 Fetchet Avenue, Joint Base Andrews MD 20762-5157 or by email at jennifer.harty@us.af.mil. Thank you for your assistance and we look forward to working with you on this undertaking.

Sincerely

CARLSON.DANN.S.1157421952 Digitally signed by CARLSON.DANN.S.1157421952 Date: 2020.12.02 17:16:08 -10'00'

DANN S. CARLSON, Brig Gen, HIANG
Commander, 154th Wing

4 Attachments:
1. PMRF – Barking Sands Project Location Map, October 2020
2. JBPHH Project Location Map, October 2020
3. Andersen AFB Project Location Map, October 2020
4. Class I Literature Review

NATIONAL GUARD BUREAU
3501 FETCHET AVENUE
JOINT BASE ANDREWS 20762-5157

JAN 29 2021

Alan Downer, PhD
Administrator
State Historic Preservation Division
Kakuhihewa Bldg
601 Kamokila Blvd, Suite 555
Kapolei, HI 96707

Dear Dr. Downer,

The National Guard Bureau (NGB) at Joint Base Andrews, Maryland would like to initiate consultation with your office under Section 106 of the National Historic Preservation Act of 1966 (NHPA), and its implementing regulations (36 CFR §800).

Pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321 et seq.), the NGB is preparing an Environmental Assessment (EA) for a proposed undertaking that will analyze potential effects to human health and the natural environment, including historic and traditional cultural properties. The undertaking includes completing two Air National Guard (ANG) Space Control Squadron (SPCS) basing actions, SPCS #4 and SPCS #5 at:

- Pacific Missile Range Facility (PMRF) – Barking Sands, HIANG 154th Wing (154 WG), located at Kauai, Hawaii (HI) (Attachment 1);
- Joint Base Pearl Harbor – Hickam (JBPHH), HIANG 154 WG, located at Honolulu, Oahu, HI (Attachment 2); or
- Andersen Air Force Base (AFB), Guam ANG (GUANG), 254th Wing (254 WG), located on Guam (Attachment 3).

The purpose of the undertaking is for the United States Air Force (USAF) to provide the facilities and locations suitable for the establishment of two ANG locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. The Area of Potential Effects (APE) for the proposed undertaking is depicted on Attachments 1, 2, and 3. A Class I Literature Review has been performed for each of the three alternative locations; the findings of the Class I Literature Review are included in Attachment 4.

Pursuant to 36 CFR Sections 800.4(a) and (b), we request your assistance defining the Area of Potential Effects (APE) and information on any historic properties located therein that may be affected by our undertaking. We intend to provide your agency with a copy of the Draft EA when the document is completed. Please inform us if additional copies are needed or if someone else within your agency other than you should receive the Draft EA.

1

In order for the NGB to address any concerns, in a timely manner, please respond within 30 days of receipt of this letter. Please provide any comments to Jennifer Harty, Cultural Resources Program Manager, 3501 Fetchet Avenue, Joint Base Andrews MD 20762-5157 or by email at jennifer.harty@us.af.mil. Thank you for your assistance and we look forward to working with you on this undertaking.

Sincerely

JENNIFER L. HARTY, GS-13, DAF
Cultural Resources Program Manager

4 Attachments:
1. PMRF – Barking Sands Area of Potential Effects Map, November 2020
2. JBPHH Area of Potential Effects Map, November 2020
3. Andersen AFB Area of Potential Effects Map, November 2020
4. Class I Literature Review, January 2021

2

# NHPA Section 106 Letter Attachments


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
PMRF-Barking Sands SPCS Site
N
0 50 100 200 300 400 500 Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,


Legend
Joint Base Pearl Harbor-Hickam AFB SPCS Sites
N
0 125 250 500 Feet
Date: 11/17/2020
Map Extent


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Andersen AFB SPCS Site Boundary
N
0
150
300
600
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

ASM affiliates
Archaeology • History • Ethnography • Architectural History

# CLASS I LITERATURE REVIEW FOR THE SPACE CONTROL SQUADRON (SPCS) BEDDOWN FOR THE FOURTH (SPCS #4) AND FIFTH (SPCS #5) BASING ACTIONS

At the request of Environmental Assessment Services, on behalf of the United States Air Force, ASM Affiliates conducted a Class I Literature Review for three candidate locations for the Space Control Squadron (SPCS) beddown for the fourth (SPCS #4) and fifth (SPCS #5) basing actions. The three candidate locations are at Pacific Missile Range Facility (PMRF) - Barking Sands, Hawai'i (Figure 1), Joint Base Pearl Harbor – Hickam (JBPHH), Hawai'i (Figure 2), and Andersen Air Force Base (AAFB), Guam (Figure 3). The Class I review included a search of the site and manuscript files available from the respective State Historic Preservation Officers and the cultural resource managers at each of the installations listed above. This report presents maps and lists of all cultural resource studies conducted and all resources located within the respective the project areas and a ¼-mile radius surrounding each project area.


Figure 1. Pacific Missile Range Facility (PMRF) project area.


Figure 2. Joint Base Pearl Harbor – Hickam (JBPHH) project area.

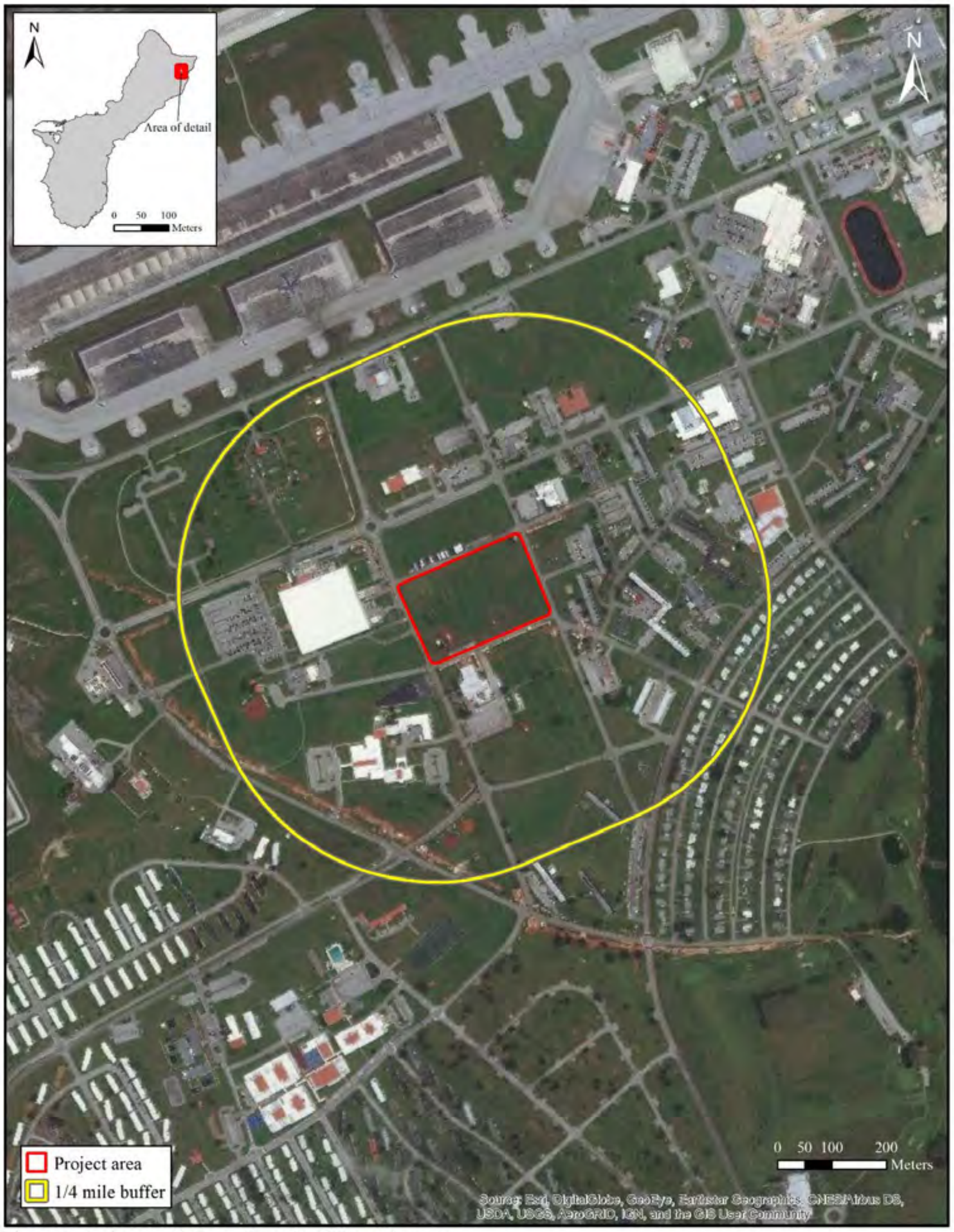


Figure 3. Andersen Air Force Base (AAFB) project area.

## PMRF BARKING SANDS, KAUA'I

Eight prior studies have been conducted within a ¼-mile radius of the proposed SPCS PMRF project area. (Table 1; Figure 4).

**Table 1. Previous studies conducted within a ¼-mile radius of the PMRF project area.**

| *Name of Company* | *Author* | *Year* | *Report Title* |
|---|---|---|---|
| State Historic Preservation Division (SHPD) | McMahon | 1988 | SHPD Field Inspection of Sand Mining Activities at Kawaiele, Kauai. TMK:1-2-02:01. |
| TEC Inc. | Leidmann and Kishinami | 1990 | Archaeological/Paleontological Survey of the Kawaiele Dunes, Kawaiele, Waimea, Kaua'i Island TMK: 1-2-02:1. |
| Advanced Sciences Inc. | Gonzalez | 1991 | Trip Report: Archaeological surface examination of four areas within PMRF and DOE/KTF that might be impacted by Strategic Target Systems related activities, Pacific Missile Range Facility (PMRF) and Department of Energy Kauai Test Facility (DOE/KTF), Barking Sands, Kauai. |
| International Archaeological Research Institute, Inc. | Jones | 1992 | Archaeological Survey and Subsurface Testing for the Tactical Control Squadron Forward Air Control Post Project, Pacific Missile Range Facility, Barking Sands, Kaua'i, Hawai'i. |
| Scientific Consultant Services, Inc. | McGerty and Spear | 1997 | An Inventory Survey with Oral Histories of a Parcel of Land on the Plain of Mana, West of Kekaha in the Ahupua'a of Waimea, District of Kona, Island of Kaua'i. |
| Paul H. Rosendahl, Ph.D., Inc (PHRI)I | Wulzen et al. | 1997 | NAVFAC 106. Final Report. Archaeological Reconnaissance Survey Pacific Missile Range Facility Barking Sands and Makaha Ridge. Land of Waimea, Waimea District, Island of Kauai. |
| International Archaeological Research Institute, Inc. | Tuggle and Tomonari-Tuggle | 1997 | Cultural Resource Assessment of Beach Landing Areas of Marine Corps Base Hawai'i, Kaneohe Bay, O'ahu, and Pacific Missile Range Facility, Kaua'i. |
| Scientific Consultant Services, Inc. | McGerty and Dega | 2000 | MSSTIC/UESA Building Inventory Survey, Pacific Missile Range Facility, Barking Sands, Island of Kaua'i, Hawai'i. |

Class I Literature Review, SPCS Beddown for SPCS #4 and SPSCS #5 Basing Actions
Page 5 of 13

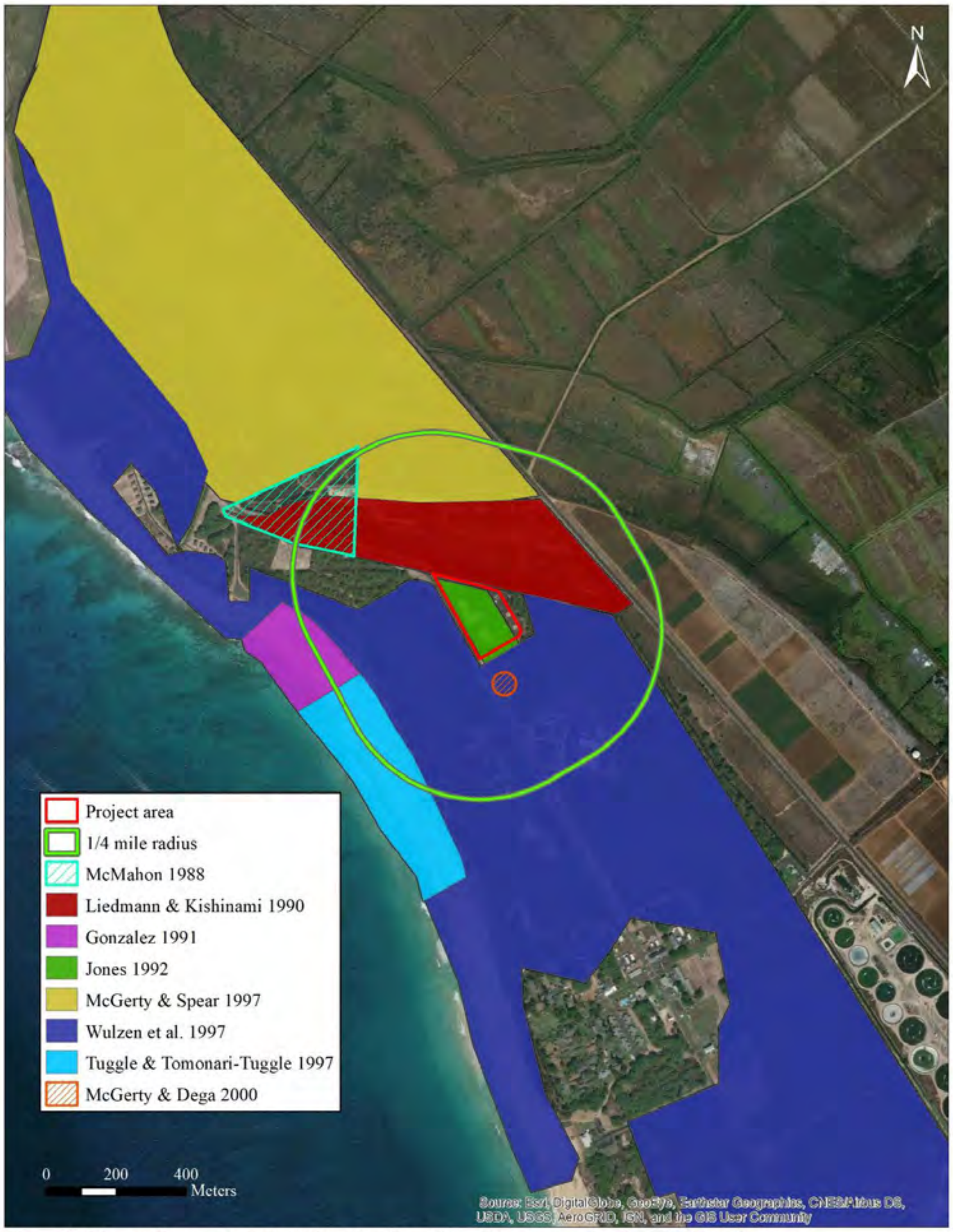


Figure 4. Prior studies conducted within a ¼-mile radius of the proposed SPCS PMRF project area.

One cultural resource (SIHP 50-30-05-2011) dating from the Historic Period has been recorded within a ¼-mile radius of the proposed SPCS PMRF project area (Table 2; Figure 5). This site was interpreted to be the surface ruins of possible World War II-era or post-World War II-era training structure (Feature A) and a recent trash deposit (Feature B). This resource was determined not eligible for listing in the National Register of Historic Places (NRHP).

**Table 2. Cultural resource recorded within a ¼-mile radius of the PMRF project area.**

| *SIHP #* | *Date recorded* | *Resource* | *NRHP status* |
|---|---|---|---|
| 50-30-05-2011 | 1997 | Complex of two Historic Period features; a wooden structure (Feature A) and a trash deposit (Feature B) | Not eligible |


Figure 5. Sites recorded within a ¼-mile radius of the proposed SPCS PMRF project area.

### JBPHH O'AHU

Two prior studies have been conducted within a ¼-mile radius of the proposed SPCS JBPHH project area (Table 3; Figure 6). Neither reported any NRHP eligible or listed historic properties.

**Table 3. Previous studies conducted within a ¼-mile radius of the JBPHH project area.**

| *Name of Company.* | *Author* | *Year* | *Report Title* |
|---|---|---|---|
| T. S. Dye & Colleagues; International Archaeological Research Institute, Inc. | Athens et al. | 2013 | Archaeological Inventory Survey of Selected Medium Probability Areas at Joint Base Pearl Harbor Hickam, Kona and 'Ewa, O'ahu, Hawai'i, TMK: (1) 9–9–001:013, (1) 1–1–001:001, and (1) 1–1–001:002. |
| Garcia and Associates | Roberts and Bower | 2002 | Archaeological Monitoring for Fire Rescue Training Facility Project, Hickam Airforce Base, Oahu Island, Hawaii (Contract No. DACA83-00-C-0024). |

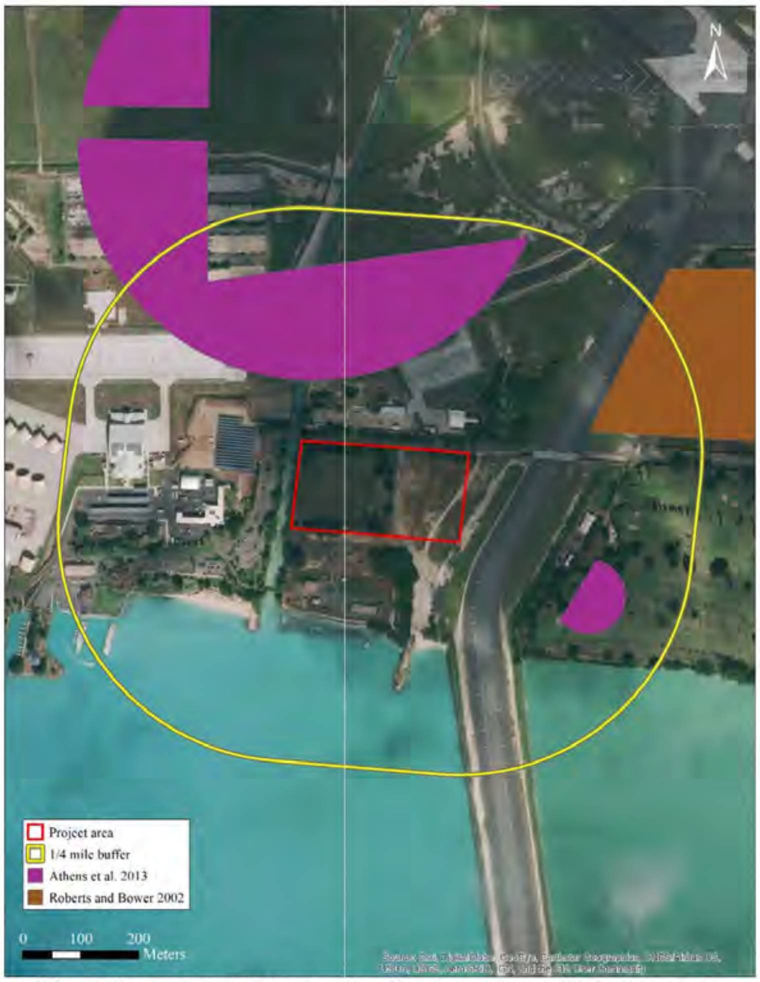


Figure 6. Prior studies conducted within a ¼-mile radius of the proposed SPCS JBPHH project area.

In addition to the two studies listed in Table 3 above, GIS data provided by the JBPHH Cultural Resource Manager were consulted for the current study. These data indicate that four cultural resources are located within a ¼-mile radius of the proposed SPCS JBPHH project area (Table 4; Figure 7). All four are historic buildings. Building 3440H (Battery Selfridge; Site 50-80-13-01600) is listed in the NRHP, having been nominated in 1977 as part of the "Artillery District of Honolulu" Multiple Property Submission along with Batteries Randolph of Fort DeRussy and Batteries Jackson, Hawkins, Hawkins Annex, and Hasbrouck of Fort Kamehameha. Information provided by the JPBHH Cultural Resources Manager also indicates that Buildings 3505H, 3510H, and 3520H are Cold War-era buildings that are considered eligible for inclusion in the NRHP.

**Table 4. Cultural resources recorded within a ¼-mile radius of the JBPHH project area.**

| *SIHP #* | *Building No.* | *Date recorded* | *Resource name* | *NRHP status* |
|---|---|---|---|---|
| 50-80-13-01600 | 3440H | 1977 | Battery Selfridge | Listed |
| - | 3505H | 2008 | Gate/Sentry House | Eligible |
| - | 3510H | 2008 | Ordinance Operations Building | Eligible |
| - | 3520H | 2008 | Small arms/Pyrotechnics Magazine | Eligible |


Figure 7. Sites recorded within a ¼-mile radius of the proposed SPCS JBPHH project area.

## AAFB GUAM

Four prior studies (three historic architectural surveys and one archaeological survey) have been conducted within a ¼-mile radius of the proposed SPCS AAFB project area (Table 5; Figure 8).

**Table 5. Previous studies conducted within a ¼-mile radius of the AAFB project area.**

| *Name of Company.* | *Author* | *Year* | *Report Title* |
|---|---|---|---|
| Mason Architects, Inc. | Yoklavich and Tuggle | 2004 | Historic Building and Associated Landscape/Viewsheds Inventory and Evaluation for Andersen Air Force Base, Guam 2004 Update. |
| Cardno TEC Inc. | Dixon and Walker | 2011 | Archaeological Investigations Conducted in Support of the Joint Guam Build-Up Environmental Impact Statement: Threshold Report No. 2. Contract N62742-06-D-1870 |
| SEARCH | Mohlman | 2014 | Historic Inventory Survey, Andersen Air Force Base, Territory of Guam. |
| SEARCH | Mohlman | 2018 | Historic Inventory of Andersen Air Force Base, Territory of Guam. |


Figure 8. Prior studies conducted within a ¼-mile radius of the proposed SPCS AAFB project area.

Thirty-six cultural resources were recorded within a ¼-mile radius of the proposed SPCS AAFB project area (Table 6; Figure 9). All are buildings, and none appear to have been assigned GHPI site numbers. Thirty-five have been determined not eligible for inclusion in the NRHP due to loss of integrity and/or lack of significance under any NRHP criterion. Facility 10032 is a volleyball court built in 1959. Facility 23010 is the Mobility Response Headquarters facility built in 1959. Facility 23022 is the 736 Security Forces Headquarters Building built in 1959. Facility 23028 is the 36 MSG Headquarters building built in 1987. Facility 25001 is an old clothing sales store (formerly an open mess, an NCO open mess, and the base package store) built in 1964. Facility 25005 is the bowling center built in 1964. Facility 25008 is a communications center (formerly a telephone exchange facility) built in 1949. Site 26006 is the Top of the Rock Club (formerly the NCO Open Mess) built in 1964. Facility 26050 is a utility screen, built in 1960, surrounding transformer equipment. Facility 27000 is the Bachelor Officers Quarters built in 1948. Facility 27030 is the Latte Stone Food Court built in 1984. Facilities 28005 through 28020 and 28044 through 28052 are twenty-three houses built in 1948 in the Fleming Heights housing quarters.

One resource has been determined eligible for listing in the NRHP. Facility 25011 is the Tinian Hall Dormitory built in 1955. It has been determined to be eligible for listing in the NRHP under the Advisory Council for Historic Preservation's 2006 Program Comment for Unaccompanied Personnel Housing (1946–1974), and the responsibilities for compliance under Section 106 have been mitigated programmatically.

**Table 6. Cultural resource recorded within a ¼-mile radius of the AAFB project area.**

| *Facility #* | *Date recorded* | *Resource name* | *NRHP status* |
|---|---|---|---|
| 10032 | 2014 | Volleyball Court | Not eligible |
| 23010 | 2014 | Mobility Response Headquarters Building | Not eligible |
| 23022 | 2014 | 736 Security Force Headquarters Building | Not eligible |
| 23028 | 2018 | 36 MSG Headquarters Building | Not eligible |
| 25001 | 2014 | Old Clothing Sales Store | Not eligible |
| 25005 | 2014 | Bowling Center | Not eligible |
| 25008 | 2014 | Communications Facility | Not eligible |
| 25011 | 2018 | Tinian Hall Dormitory | Eligible |
| 25014 | 2018 | Air conditioning plant building | Not eligible |
| 26006 | 2014 | Top of the Rock Club | Not eligible |
| 26050 | 2014 | Utility Screen | Not eligible |
| 27000 | 2014 | Bachelor Officers Quarters | Not eligible |
| 27030 | 2018 | Latte Stone Food Court | Not eligible |
| 28005-28020, 28044-28052 | 2014 | Fleming Heights Houses | Not eligible |

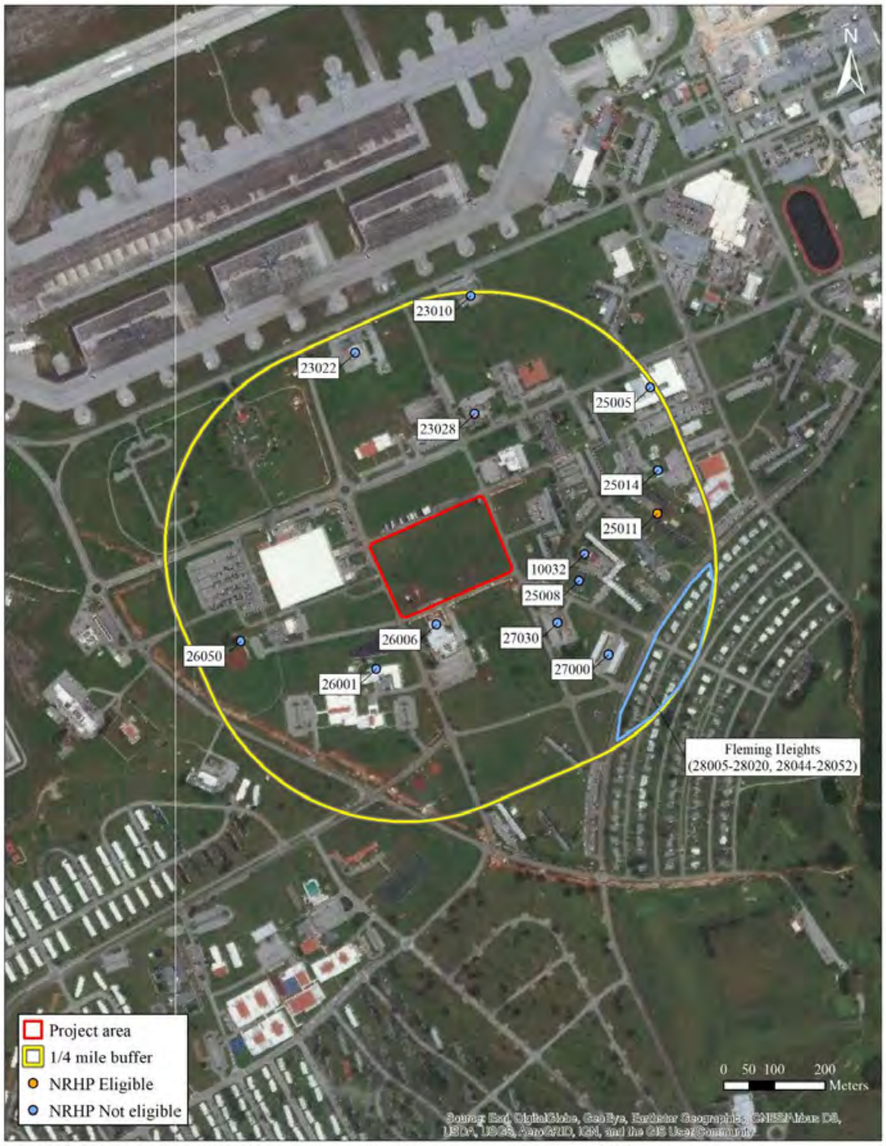


Figure 9. Sites recorded within a ¼-mile radius of the proposed SPCS AAFB project area.

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# Appendix A-1.3

## Sample Interagency and Intergovernmental Letters

**NATIONAL GUARD BUREAU**
**3501 FETCHET AVENUE**
**JOINT BASE ANDREWS 20762-5157**

**JAN 29 2021**

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews, MD 20762

NOAA Fisheries
Pacific Islands Regional Office
1845 Wasp Blvd, Building 176
Honolulu, HI 96818

Dear Sir/Madam,

The National Guard Bureau (NGB) is currently investigating the feasibility of completing two Air National Guard (ANG) Space Control Squadron (SPCS) basing actions, SPCS #4 and SPCS #5 at:

- Pacific Missile Range Facility (PMRF) – Barking Sands, HIANG 154th Wing (154 WG), located at Kauai, Hawaii (HI) (Attachment 1);
- Joint Base Pearl Harbor – Hickam (JBPHH), HIANG 154 WG, located at Honolulu, Oahu, HI (Attachment 2); or
- Andersen Air Force Base (AFB), Guam ANG (GUANG), 254th Wing (254 WG), located on Guam (Attachment 3).

The purpose of the Proposed Action is for the United States Air Force (USAF) to provide the facilities and locations suitable for the establishment of two ANG locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission (SPCS #4) and one defensive mission (SPCS #5). The Proposed Action rectifies the need to meet the 2015 Air Force Space Command Commander (AFSPC/CC) Air Reserve Component (ARC) Initiative priority to generate four additional ANG unit-equipped Unit Type Codes (UTCs) to meet Combatant Command (COCOM) needs for offensive space control. ANG SPCS #1, SPCS #2, and SPCS #3 were previously established to execute the offensive mission. SPCS #4 would accomplish this goal as it would provide for the fourth of four ANG SPCS offensive missions to be established. ANG SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet COCOM requirements for defensive space control. Currently, there is no defensive SPCS in the ANG. As directed by the National Environmental Policy Act (NEPA), the NGB, with support from Environmental Assessment Services, LLC, is preparing an Environmental Assessment (EA) in order to evaluate the potential environmental effects associated with the Proposed Action.

SPCS #4 and SPCS #5 would accommodate the offensive and defensive missions, respectively, and would be located at one of the three candidate locations identified above. Each SPCS would require the beddown of additional personnel in order to support the SPCS mission, including a sufficient number of ANG space operators and operations support personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, while SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission. Under the Proposed Action, facilities would be constructed in support of each SPCS. Each SPCS would require the modification of existing facilities or construction of new facilities in support of the basing action.

The NGB, 154 WG, and 254 WG are interested in information or agency-specific preliminary comments that would alleviate or highlight areas of concerns preceding this EA. Areas of concern may include potential effects to: physical, ecological, social, cultural, and archaeological resources. The NGB, 154 WG, and 254 WG also request any information that your agency may have regarding other proposed, ongoing, or recently completed projects that could create or exacerbate impacts to the Proposed Action.

Please respond within thirty (30) days of receipt of this letter to Christine Yott, ATTN: SPCS EA, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762-5157 or by email at NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil with the subject titled as ATTN: SPCS EA. Thank you for your assistance.

Sincerely

YOTT.CHRISTINE.JUNE.1287505015 Digitally signed by YOTT.CHRISTINE.JUNE.1287505015 Date: 2020.12.01 08:09:13 -05'00'

CHRISTINE J. YOTT, M.S., GS-13
Physical Scientist (Environmental)

3 Attachments:
1. PMRF – Barking Sands Project Location Map, October 2020
2. JBPHH Project Location Map, October 2020
3. Andersen AFB Project Location Map, October 2020

**NATIONAL GUARD BUREAU**
**3501 FETCHET AVENUE**
**JOINT BASE ANDREWS 20762-5157**

6 August 2021

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews MD 20762

Katherine Mullett
Field Supervisor
US Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu HI 96850

**SUBJECT:** Seeking Concurrence on Determination for Proposed Space Control Squadron (SPCS) Beddown at Pacific Missile Range Facility (PMRF)-Barking Sands, Hawaii

Dear Ms. Mullett

The National Guard Bureau (NGB) is developing a draft Environmental Assessment (EA) addressing the proposed beddown of two SPCSs at three candidate locations. The candidate locations are PMRF-Barking Sands, Hawaii; Joint Base Pearl Harbor-Hickam (JBPHH), Hawaii; and Andersen AFB, Guam.

The focus of this memorandum is on the beddown of a SPCS at PMRF-Barking Sands with the purpose of providing the facilities and locations suitable for the establishment of an Air National Guard (ANG) location with access to geosynchronous satellites in the Pacific theater.

In accordance with Section 7 of the Endangered Species Act, NGB is requesting concurrence for our *may affect, but is not likely to adversely affect determination* for the proposed beddown of a SPCS at the proposed location on PMRF-Barking Sands.

Within PMRF-Barking Sands, a number of federally listed or state listed threatened or endangered species are known to occur on or adjacent to the installation. There are no federally or State of Hawaii (SOH)-listed threatened or endangered plant species that occur naturally on PMRF–Barking Sands. Federally designated critical habitat for the lau'ehu (*Panicum niihauense*) is present on the installation, but the plant has not been observed. Critical habitat for special status species is not located on the proposed SPCS site. The federally listed or state listed threatened or endangered species included as part of the 2014 Biological Opinion (BO) are as follows: Hawaiian petrel (*Pterodroma sandwichensis*); band-rumped storm-petrel (*Oceanodroma castro*); Hawaiian black-necked stilt (*Himumtopus mexicanus knudseni*); Hawaiian moorhen (*Gallinula chloropus sandvicensis*); Hawaiian coot (*Fulica alai*); Hawaiian duck (*Anas wyvilliana*); Hawaiian goose (*Branta sandvicensis*); Hawaiian hoary bat (*Lasiurus cinereus semotus*); and the threatened Newell's shearwater (*Puffinus auricularis newelli*).

Construction activities associated with the Proposed Action would occur entirely within the existing boundaries of PMRF-Barking Sands in areas of existing land use that include land currently developed and classified industrial. Land use surrounding the site is open space, and the Kawai'ele Waterbird Sanctuary is located approximately 400 feet directly north of the site, outside of the boundaries of the installation; however, no permanent changes to the noise environment would occur with the implementation of the Proposed Action, and noise impacts would be temporary during the construction period. Therefore, there would be no changes to existing land use or land use compatibility with the implementation of the Proposed Action.

The Hawaiian goose (nēnē) is commonly observed on the proposed SPCS site for the Proposed Action, which is one of the most commonly utilized nesting areas on PMRF-Barking Sands. The majority of the proposed SPCS site is currently paved, with small areas of landscaped grasses, trees, and shrubs that are highly disturbed by regular mowing and maintenance. Areas of disturbance associated with the Proposed Action would be relatively small and would be temporary and localized, and construction and renovation activites would be conducted in accordance with the terms of the 2014 BO and 2018 reinitiation BO. As part of the design process, a vegetation management plan would be drafted that would dictate a mowing schedule in order to prevent the growth of vegetation within the proposed SPCS site. Specifically, vegetation located along the northeastern side of the compound would be mowed at regular intervals in order to prevent the vegetation from reaching a height that would attract nesting nēnēs. Given these circumstances, PMRF–Barking Sands has determined that the Proposed Action *may affect, but is not likely to adversely affect*, the nēnē.

In order to prevent harm to the nocturnal fledglings of Newell's shearwater, Hawaiian petrel, and the band-rumped storm-petrel, lighting design plans associated with the proposed construction would be required to meet the terms of the 2014 BO and 2018 BO, including focusing outside lighting downward and utilizing the required colored bulbs as set forth in the BOs for all outside structures, towers, and electrical distribution lines. Construction slated to occur during the nocturnal seabird fledgling period (mid-September through mid-December) would occur only during daylight hours. Between mid-September and mid-December, dusk to dawn perimeter lighting would be turned off at all times and flood area lighting would be turned off. Security infrared lighting would be used at all times in and around the facility's restricted area. Security lighting at the proposed SPCS facility would be a combination of infrared and regular lighting and all newly-installed fixtures would be full cutoff, with bulbs shielded above and around all sides. Hawaii ANG is also considering lighting with a yellowish tint that would be less likely attract insects and their predators (i.e., birds and bats)

Construction and renovation of the proposed facilities at PMRF-Barking Sands would include barbed wire at the top of existing fencing that surrounds the site. In order to prevent harm to the Hawaiian hoary bat, which are known to collide with barbed wire, aluminium tags will be placed along the top of the barbed wire fencing to provide visual and auditory cues to the bats. Two aluminum plant tags will be placed on the top strand of barbed wire halfway between each fence post. The aluminum plant tags will be fastened in a manner that allows them to move about freely in the wind, so they may function as a visual clue and they will be spaced close enough together so they come into contact with each to generate an auditory cue.

Construction and renovation activities would be conducted in accordance with the stipulations of the 2014 BO, dated 9 September 2014, that initiated formal consultation for the Hawaiian black-necked stilt, Hawaiian moorhen, Hawaiian coot, Hawaiian duck, nēnē, Hawaiian hoary bat, Hawaiian petrel, Newell's shearwater, and band-rumped storm petrel, as well as the 2018 reinitiation BO for Newell's shearwater.

We request your concurrence with our determination that the proposed action *may affect, but is not likely to adversely affect determination* and we request your review of and comments on the attached Draft Environmental Assessment for this Proposed Action.

Please provide any comments or information within 45 days of the receipt of this correspondence to to Christine Yott, ATTN: SPCS EA, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762-5157 or by email at NGB.A4.A4A.NEPA.COMMENTS.org@us.af.mil with the subject titled as ATTN: SPCS EA.

Sincerely

YOTT.CHRISTINE.JUNE.1287505015 Digitally signed by YOTT.CHRISTINE.JUNE.1287505015 Date: 2021.08.06 08:33:56 -04'00'

CHRISTINE J. YOTT, GS-13, DAF
NEPA Program Manager

3 Attachments:
1. 2014 Biological Opinion
2. 2018 Reinitiation Biological Opinion
3. Scoping Letter dated 1 February, 2021

# IICEP Letter Attachments


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
PMRF-Barking Sands SPCS Site
N
0 50 100 200 300 400 500
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,


Legend
Joint Base Pearl Harbor-Hickam AFB SPCS Sites
N
0 125 250 500
Feet
Date: 11/17/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Andersen AFB SPCS Site Boundary
N
0
150
300
600
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

# Appendix A-2

# Andersen Air Force Base, Guam

# Appendix A-2.1

# Stakeholder Mailing List

Douglas Domenech
Assistant Secretary
DOI-Office of Insular Affairs, Capital Improvement Program for Guam
Main Interior Building
1849 C Street NW
Washington, DC 20240

Tyrone J. Taitano
Director
Guam Bureau of Statistics and Plans
PO Box 2950
DOI-Office of Insular Affairs, Capital Improvement Program for Guam
Hagatna, Guam 96923

Conchita Taitano
Air & Land Administrator
Air and Land Programs Division
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Barrigada, Guam 96921

Walter Leon Guerrero
Administrator
Guam EPA
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Barrigada, Guam 96921

Vincent Arriola
Director
Government of Guam
Department of Public Works
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Tamuning, Guam 96913

Brent Tibbats
Fisheries Biologist
Guam Department of Agriculture, Division of Aquatic and Wildlife Resources
192 Dairy Road
Mangilao, Guam 96913

Lou Leon Guerrero
Governor, Terriroty of Guam
Office of the Governor
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Hagatna, Guam 96932

Madeleine Bordallo
Guam Governor's Liaison
Washington Office
Governor of Guam
444 North Capitol Street
Washington, DC 20001

Michael San Nicolas
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U.S. House of Representatives
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Washington, DC 20515-5301

U.S. Department of Interior
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Washington, DC 20240

John Busterud
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US Environmental Protection Agency, Region 9
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San Francisco, CA 94105

Raquel Girvin
Western-Pacific Regional Administrator
Federal Aviation Administration
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El Segundo, CA 90245

Kirk Gibbs
Commander and Division Engineer
US Army Corps of Engineers, Pacifc Ocean Division
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Tiyan Barrigada, Guam 96913

Patrick Lujan
SHPO
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Agana Heights, Guam 96910

Daniel Stone
Chief
Guam Fire Department
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Robyn Thorson
Regional Director
USFWS Pacific Region
911 NE 11th Avenue
Portland, OR 97232-4181

# Appendix A-2.2

# National Historic Preservation Act Section 106 Letters

**DEPARTMENT OF THE AIR FORCE**
**HEADQUARTERS 36TH WING (PACAF)**
**ANDERSEN AIR FORCE BASE GUAM**

8 March 2021

36 Civil Engineer Squadron
Environmental Flight
Unit 14007
APO AP 96543-4007

RECEIVED
2:51
MAR 08 2021
GUAM HISTORIC RESOURCES DIVISION

Carlotta Leon Guerrero
State Historic Preservation Officer (SHPO)
Guam Historic Resources Division
Department of Parks and Recreation
490 Chalan Palasyo
Agaña Heights, Guam 96910

Subject: Section 106 Consultation -**Space Control Squadron (SPCS) Beddown Environmental Assessment,** Andersen Air Force Base, Guam; on Behalf of the Air National Guard Readiness Center (RCS Pending)

Dear Ms. Leon Guerrero:

Andersen Air Force Base (AAFB) requests your review of a proposed project for the creation of facilities and infrastructure for the Space Control Squadron (See Attachment 1 for location). The initial scoping and site selection for this project is currently being undertaken by ASM Affiliates on behalf of the Air Force and Ms. Jennifer Harty, the Cultural Resource Manager at the Air National Guard Readiness Center. For your reference and use, please find enclosed two copies of the *Class I Literature Review for the Space Control Squadron (SPCS) Beddown for the Fourth (SPSC #4) and Fifth (SPSC #5) Basing Actions*, prepared by ASM Affiliates.

Pursuant to Section 106 of the National Historic Preservation Act (NHPA), we have reviewed the proposed project scope and determined that the ground disturbance associated with this project is an undertaking as defined in 36 CFR 800.16(y).

**Project Location and Description**:

The project involves construction of facilities and infrastructure in the main cantonment area of Andersen Air Force Base in the block bounded by New York Avenue, Mobile Avenue, 4$^{th}$ Street, and 5$^{th}$ Street (Attachment 1 & 2). Construction would include infrastructure such as utilities, driveways, and parking lots; as well as buildings to support COCOM requirements for defensive space control. The block comprising the APE is approximately 495 feet x 780 feet (386,100 ft$^2$), or 8.86 acres.

The location is currently a lawn area which is surrounded on all sides by paved road, and otherwise devoid of structures. Historically, the entire APE has been graded, rebuilt, and regraded in order to arrive at its current state (Attachment 3 & 4).

**Area of Potential Effect:**

The Area of Potential Effect (APE) for this project is shown within the red rectangle on Attachment 2. The specifications for structures within the APE have not yet been finalized due to the speculative stage of the project. However, it may be assumed that the project will involve grading the majority of the block to the bedrock, and digging the foundations of buildings into the limestone. The projected facilities include an approximately 12,100 square foot bed-down facility with utility connections; a 2,500 square-yard equipment pad with a 50 foot offset for security fencing; and a 2,500 square-yard parking lot. Due to the extensive disturbance of the project area, all soils currently above the bedrock are likely to be fill which was placed for the lawn that currently exists across the APE.

**Identification of Historic Properties:**

*Archaeology:*

No eligible archaeological sites exist within the APE. The block was surveyed in 2010 and 2011 in support of the Joint Guam Build Up. As at present, it was observed to be part of the cleared and developed cantonment [Welch 2010; Dixon and Walker 2011].

Aerial photos from 1944 show the area still covered with vegetation but striated with bulldozer lines, during historic military surveys of the jungle. The vegetation was graded sometime between 1944 and 1953, and the APE was entirely covered with military infrastructure by 1953 (Attachment 3). By 1967, the area was covered with entirely different buildings, suggesting the area was graded between the two periods of development (Attachment 4). All structures present in 1967 have since been demolished, suggesting a third period of grading.

Due to the extensive disturbance from these activities, and the shallow nature of the bedrock in historically-graded areas of the main cantonment, it may be inferred that no undisturbed sites exist within the APE. It is shown in the ICRMP as a low probability area for potential archaeological resources (Attachment 5) [SEARCH 2015].

*Built Environment:*

No buildings exist within the APE, nor does it fall within any NRHP eligible districts. The area has undergone thorough historical inventory surveys [Mohlman, 2014, 2018; Yoklavich and Tuggle, 2004]. For further reference, Supplement 1 provides a summary of buildings surveyed within a quarter-mile radius of the APE.

**Determination of Project Effect:**

Based on the evaluation that there are no eligible historic properties within the APE, and that the proposed ground disturbance is within an area heavily disturbed by the previous construction of multiple phases of base structures, we have made a determination of **no historic**

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

**properties affected** for the proposed undertaking. Consequently, Andersen Air Force Base respectfully requests concurrence from Guam SHPO with this determination. In accordance with 36 CFR 800.5(c) (1), if we receive no response from your office within 30 days of receipt of this letter we will assume no objections to the determination of project effect and site eligibility.

If archaeological resources are inadvertently discovered during ground-disturbing activities, then the Standard Operating Procedures contained with the *Final Integrated Cultural Resource Management Plan for Andersen AFB* [SEARCH, 2015] will be followed as well as all appropriate federal and state regulations and guidelines.

We value your support in our efforts to continue carrying out the United States Air Force's responsibility regarding the management of its cultural resources. Should you have any questions or require additional information about this proposed project, please feel free to contact me via phone at (671) 366-1019 or e-mail at amanda.murphy.9@us.af.mil.

Sincerely,

Amanda L. Murphy
Archaeologist, AAFB
Conservation Resources
Environmental Flight

Attachments
1.Project Locations Map
2.Aerial Photo
3.1953 Air Photo
4.1967 Air Photo
5.ICRMP Figure 5.1, Site Probability Map

Supplements
*Class I Literature Review for the Space Control Squadron (SPCS) Beddown for the Fourth (SPSC #4) and Fifth (SPSC #5) Basing Actions*, prepared by ASM Affiliate for Department of the Air Force.

REFERENCES

Dixon, B. and C. Walker
2011 Archaeological Investigations Conducted in Support of the Joint Guam Build-Up Environmental Impact Statement: Threshold Report No. 2. Cardno TEC Inc. Prepared for Department of the Navy, Naval Facilities Engineering Command.

Mohlman, Geoffrey

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2014 Historic Inventory Survey, Andersen Air Force Base, Territory of Guam, Contract Number N40192-12-P-5010. SEARCH report. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.

2018 Historic Inventory Survey, Andersen Air Force Base, Territory of Guam, Contract Number N62470-12-D-7008. SEARCH Project # 3791-16191F. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.

SEARCH
2015 *Integrated Cultural Resources Management Plan for Andersen Air Force Base, Joint Region Marianas*. Prepared for NAVFAC Marianas.

Welch, David J.
2010 Archaeological Surveys and Cultural Resource Studies on the Island of Guam in Support of the Joint Guam Build-Up Environmental Impact Statement. IARII 200713. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.

Yoklavich, A. and H. D. Tuggle
2004 Historic Building and Associated Landscape/Viewsheds Inventory and Evaluation for Andersen Air Force Base, Guam 2004 Update. Mason Architects, Inc. report. Prepared for Andersen Air Force Base, Guam.

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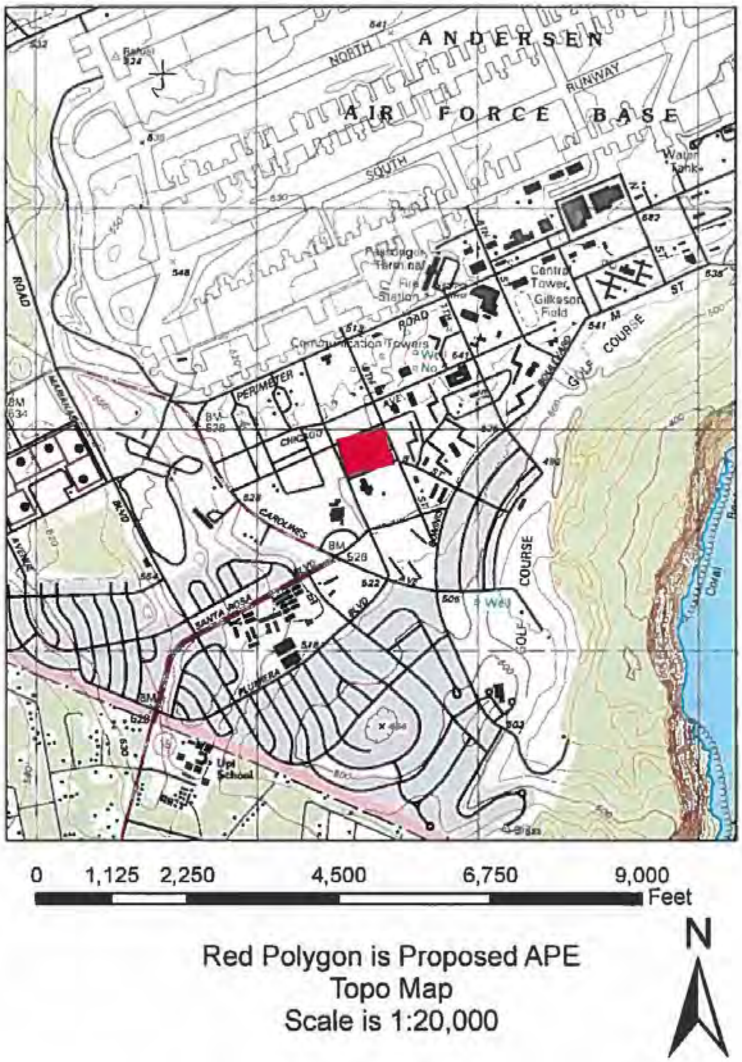
Attachment 1

## Space Command




Red Polygon is Proposed APE
Topo Map
Scale is 1:20,000

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

Attachment 2

## Space Command


Red Polygon is Proposed APE
2016 High Res Photo
Scale is 1:8,000

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

Attachment 3

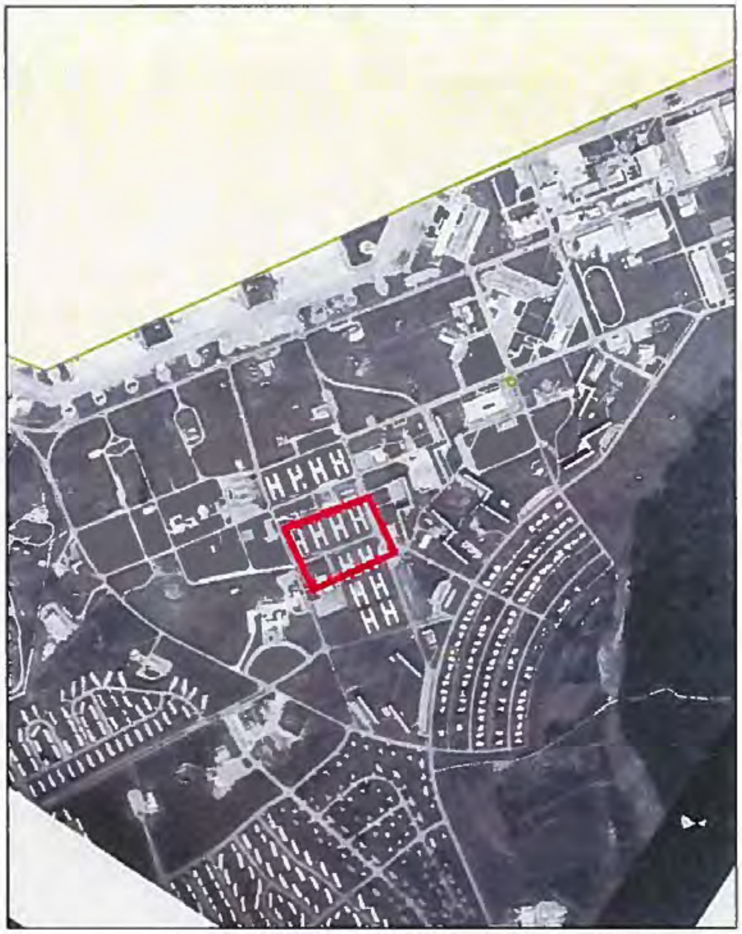
# Space Command


Red Polygon is Proposed APE
1953 Air Photo
Scale is 1:8,000

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

Attachment 4

Space Command

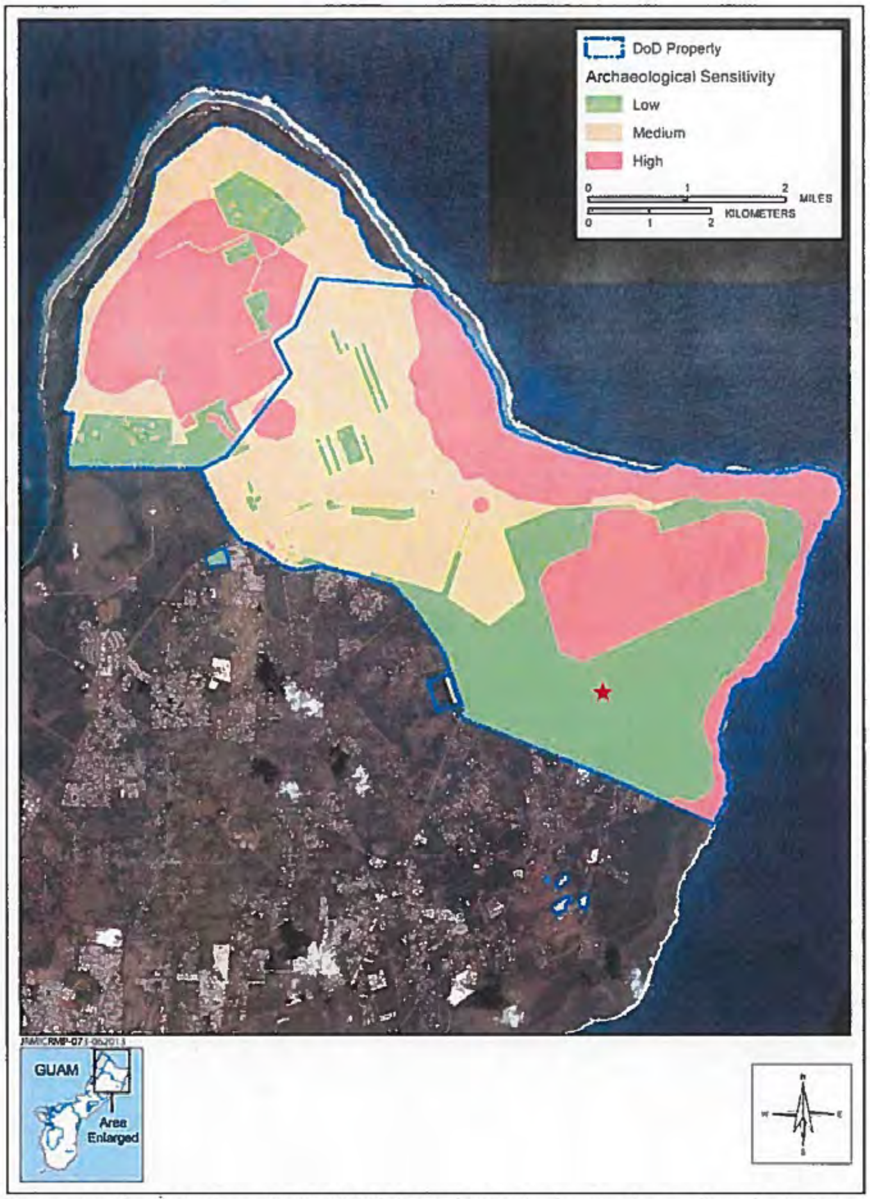


0 500 1,000 2,000 3,000 4,000 Feet

N

Red Polygon is Proposed APE
1967 Air Photo
Scale is 1:12,000

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*




Attachment 5: Figure 5.1 from AAFB ICRMP (Search 2015), showing low archaeological site probability in and around the APE (red star).

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

**DEPARTMENT OF THE AIR FORCE**
**HEADQUARTERS 36TH WING (PACAF)**
**ANDERSEN AIR FORCE BASE GUAM**

08 April 2021

Amanda Murphy
Cultural Resource Manager
36 CES/CEV
Andersen AFB Guam
Unit 14007
APO AP 96543-4007

TO
Jeffrey Laitila
Environmental Flight Chief
36 CES/CEV
Andersen AFB Guam
Unit 14007
APO AP 96543-4007

FROM: 36 CES/CEV CRM

SUBJECT: MEMORANDUM FOR 36 CES/CEV RECORD Re: Lapsed Sec 106 Consultation, Space Control Squadron (SPCS) Beddown Environmental Assessment [AAFB No RCS/GSHPO RC 2021-0058]

References: (a) 36 CFR Part 800—PROTECTION OF HISTORIC PROPERTIES (incorporating amendments effective August 5, 2004)
(b) Class I Literature Review for the Space Control Squadron (SPCS) Beddown for the Fourth (SPSC #4) and Fifth (SPSC #5) Basing Actions, prepared by ASM Affiliate for Department of the Air Force.
(c) Dixon, B. and C. Walker 2011 Archaeological Investigations Conducted in Support of the Joint Guam Build-Up Environmental Impact Statement: Threshold Report No. 2. Cardno TEC Inc. Prepared for Department of the Navy, Naval Facilities Engineering Command.
(d) Welch, David J. 2010 Archaeological Surveys and Cultural Resource Studies on the Island of Guam in Support of the Joint Guam Build-Up Environmental Impact Statement. IARII 200713. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.
(e) Mohlman, Geoffrey 2018 Historic Inventory Survey, Andersen Air Force Base, Territory of Guam, Contract Number N62470-12-D-7008. SEARCH Project # 3791-16191F. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.
(f) SEARCH 2015 Integrated Cultural Resources Management Plan for Andersen Air Force Base, Joint Region Marianas. Prepared for NAVFAC Marianas.

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

On 8 March 2021, 36 CES/CEV Cultural Resources Manager, Amanda Murphy, facilitated a Section 106 consultation with the Guam State Historic Preservation Office (SHPO), including supplemental documentation, and requested concurrence with a determination of **No Historic Properties Affected** for the proposed undertaking. Guam SHPO failed to respond within 30 days and as a result, 6 April 2021 was noted as the consultation's formal completion date. Per 36 CFR 800.4 (d)(1) (i), *If the SHPO/THPO, or the Council, if it has entered the section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under section 106 are fulfilled* in the case of **No Historic Properties Affected** determinations.

The basis of the determination is as follows:

i. The area has been previously surveyed and inventoried during the Joint Guam Build Up and other base studies (Welch 2010; Dixon and Walker 2011; Mohlman 2018);
ii. No historic properties exist within the APE, and the area is currently devoid of structures;
iii. Aerial photos from 1953 and 1967 indicate several periods of complete grading, infrastructure build-up, and demolition in the APE;
iv. And the area is considered to be a low-probability area for archaeological sites based on the ICRMP (SEARCH 2015).

Following the lapsed 30-day deadline for a SHPO response, SHPO reentered the consultation process on 7 April 2021. Although, per 36 CFR 800.3(c)(4), Andersen Air Force Base CRM is not *required to reconsider previous findings or determinations* following the lapse of the deadline, SHPO concurred with AAFB's determination. It is the determination of the Cultural Resources Program Manager that we have now fulfilled our obligations per CFR 800.4 (a) through (c), and the project may proceed on the basis of the above-mentioned findings.

AMANDA MURPHY
Cultural Resource Manager
36th Civil Engineer Squadron

Attachments: (a) 8 Mar 21 Section 106 Consultation for Space Control Squadron (SPCS) Beddown Environmental Assessment [No RCS];
(b) 7 Apr 21 (rcvd) GSHPO Response/Concurrence, dtd 6 Apr 21

**Department of Parks and Recreation**
*Dipattamenton Plaset yan Dibuetsion*
Government of Guam
Director's Office, Parks and Recreation Divisions
#1 Paseo de Susana, Hagåtña, Guam 96910
P.O. Box 2950, Hagåtña, Guam 96932
(671) 475-6288; Facsimile (671) 477-0997
Guam Historic Resources Division
490 Chalan Palasyo, Agana Heights, Guam 96910
(671) 475-6294/6355; Facsimile (671) 477-2822

**Lourdes A. Leon Guerrero**
*Governor*
**Joshua F. Tenorio**
*Lt. Governor*

**Roque A. Alcantara**
*Director*
**Victor R. Villagomez**
*Deputy Director*

April 6, 2021

In reply refer to:
RC 2021-0558

Amanda L. Murphy
Archaeologist/ CRM AAFB
36 Civil Engineering Squadron
Environmental Flight
Unit 14007
APO AP 96943-4007

Subject: Section 106 Consultation – Space Control Squadron (SPCS) Beddown Environmental Assessment, Andersen Air Force Base, Guam; on Behalf of the Air National Guard Readiness Center (RCS Pending)

Dear Mrs. Murphy,

We reviewed the subject undertaking and agree there are no eligible sites within the APE. Based on the project description the approximately 12,000 square foot bed-down facility, utility connections, the 2,500 sq. yd. equipment pad including the 50-foot offset for security fencing; and the 2,500 sq. yd. parking lot will have no impact. The APE for the undertaking 8.86 acres.

Therefore, we concur with the determination of "No historic properties affected". However, the subject lot will be subject to 36 CFR 800.13 Post Review Discovery in the event of inadvertent discoveries.

Should you have any questions, please do not hesitate to contact Mr. John Mark Joseph, State Archaeologist at JohnMark.Joseph@dpr.guam.gov.

Sincerely,

Carlotta Leon Guerrero
Acting State Historic Preservation Officer

# Appendix A-2.3

## Sample Interagency and Intergovernmental Letters

NATIONAL GUARD BUREAU
3501 FETCHET AVENUE
JOINT BASE ANDREWS 20762-5157

JAN 29 2021

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews, MD 20762

Douglas Domenech, Assistant Secretary
DOI-Office of Insular Affairs, Capital Improvement
Program for Guam
Main Interior Building
1849 C Street NW
Washington, DC 20240

Dear Mr. Domenech,

The National Guard Bureau (NGB) is currently investigating the feasibility of completing two Air National Guard (ANG) Space Control Squadron (SPCS) basing actions, SPCS #4 and SPCS #5 at:

- Pacific Missile Range Facility (PMRF) – Barking Sands, HIANG 154th Wing (154 WG), located at Kauai, Hawaii (HI) (Attachment 1);
- Joint Base Pearl Harbor – Hickam (JBPHH), HIANG 154 WG, located at Honolulu, Oahu, HI (Attachment 2); or
- Andersen Air Force Base (AFB), Guam ANG (GUANG), 254th Wing (254 WG), located on Guam (Attachment 3).

The purpose of the Proposed Action is for the United States Air Force (USAF) to provide the facilities and locations suitable for the establishment of two ANG locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission (SPCS #4) and one defensive mission (SPCS #5). The Proposed Action rectifies the need to meet the 2015 Air Force Space Command Commander (AFSPC/CC) Air Reserve Component (ARC) Initiative priority to generate four additional ANG unit-equipped Unit Type Codes (UTCs) to meet Combatant Command (COCOM) needs for offensive space control. ANG SPCS #1, SPCS #2, and SPCS #3 were previously established to execute the offensive mission. SPCS #4 would accomplish this goal as it would provide for the fourth of four ANG SPCS offensive missions to be established. ANG SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet COCOM requirements for defensive space control. Currently, there is no defensive SPCS in the ANG. As directed by the National Environmental Policy Act (NEPA), the NGB, with support from Environmental Assessment Services, LLC, is preparing an Environmental Assessment (EA) in order to evaluate the potential environmental effects associated with the Proposed Action.

SPCS #4 and SPCS #5 would accommodate the offensive and defensive missions, respectively, and would be located at one of the three candidate locations identified above. Each SPCS would require the beddown of additional personnel in order to support the SPCS mission, including a sufficient number of ANG space operators and operations support personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, while SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission. Under the Proposed Action, facilities would be constructed in support of each SPCS. Each SPCS would require the modification of existing facilities or construction of new facilities in support of the basing action.

The NGB, 154 WG, and 254 WG are interested in information or agency-specific preliminary comments that would alleviate or highlight areas of concerns preceding this EA. Areas of concern may include potential effects to: physical, ecological, social, cultural, and archaeological resources. The NGB, 154 WG, and 254 WG also request any information that your agency may have regarding other proposed, ongoing, or recently completed projects that could create or exacerbate impacts to the Proposed Action.

Please respond within thirty (30) days of receipt of this letter to Christine Yott, ATTN: SPCS EA, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762-5157 or by email at NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil with the subject titled as ATTN: SPCS EA. Thank you for your assistance.

Sincerely

YOTT.CHRISTINE.JUNE.1287505015 Digitally signed by YOTT.CHRISTINE.JUNE.1287505015 Date: 2020.12.01 08:09:13 -05'00'

CHRISTINE J. YOTT, M.S., GS-13
Physical Scientist (Environmental)

3 Attachments:
1. PMRF – Barking Sands Project Location Map, October 2020
2. JBPHH Project Location Map, October 2020
3. Andersen AFB Project Location Map, October 2020

NATIONAL GUARD BUREAU
3501 FETCHET AVENUE
JOINT BASE ANDREWS 20762-5157

24 August 2021

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews MD 20762

Katherine Mullett
Field Supervisor
US Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd
PO Box 50088
Honolulu HI 96850-5000

**SUBJECT:** Seeking Concurrence on Determination for Proposed Space Control Squadron (SPCS) Beddown at Andersen Air Force Base (AFB), Guam

Dear Ms. Mullett

The National Guard Bureau (NGB) is developing a draft Environmental Assessment (EA) addressing the proposed beddown of two SPCSs at three candidate locations. The candidate locations are PMRF-Barking Sands, Hawaii; Joint Base Pearl Harbor-Hickam (JBPHH), Hawaii; and Andersen AFB, Guam.

The focus of this memorandum is on the beddown of a SPCS at Andersen AFB with the purpose of providing the facilities and locations suitable for the establishment of an Air National Guard (ANG) location with access to geosynchronous satellites in the Pacific theater. In accordance with Section 7 of the Endangered Species Act, NGB is requesting concurrence for our *not likely to adversely affect* determination for the proposed beddown of a SPCS at the proposed location on Andersen AFB.

**Threatened, Endangered, and Candidate Species and Critical Habitat**

A review of the U.S. Fish and Wildlife Service Environmental Conservation Online System identified the federally listed species with the potential to occur in the area of the proposed SPCS site. Construction activities associated with the Proposed Action would occur entirely within the boundaries of Andersen AFB in areas of existing land that are considered developed and are devoid of natural vegetation.

Federal- or Guam-listed endangered and threatened species observed on Andersen AFB (and surrounding marine areas) includes the following:

| Scientific Name | Common Name | Federal Status | Guam Status |
|---|---|---|---|
| **Wildlife** | | | |
| *Pteropus mariannus* | Mariana fruit bat | T | E |
| *Gallinula chloropus guami* | Mariana common moorhen | E | E |
| *Aplonis opaca* | Micronesian starling | - | E |
| *Eretmochelys imbricata* | Hawksbill turtle | E | E |
| *Chelonia mydas* | Green sea turtle | E | E |
| *Emoia atrocostata* | Tide-pool skink | - | E |
| *Emoia cyanura* | Azure-tailed skink | - | E |
| *Emoia slevini* | Slevin's skink | E | E |
| *Lipinia noctua* | Moth skink | - | E |
| *Nactus pelagicus* | Pacific slender-toed gecko | - | E |
| *Perochirus ateles* | Micronesian gecko | - | E |
| *Partula gibba* | Humped tree snail | E | E |
| *Partula radiolata* | Guam tree snail | E | E |
| *Hypolimnas octocula marianesis* | Mariana eight-spot butterfly | E | - |

There is no critical habitat for listed species within the proposed SPCS site. The closest area identified as sensitive habitat is the Pati Point Marine Preserve Area, which is approximately 0.5-mile from the proposed SPCS site

**Determination of the Effects of the Proposed Action**

The Micronesian starling (*Aplonis opaca)* is the only listed species with the potential to occur on the proposed SPCS site; however, this species has not been identified on the property. No formal surveys have been conducted in support of the Proposed Action. Endemic to the Mariana Islands, the Micronesian starling is only found in three known locations on Guam, and they prefer to nest and roost in colonies in caves. Due to the developed nature of the proposed SPCS site, the NGB has determined that the Proposed Action is *not likely to adversely affect* the Micronesian Starling.

We request your concurrence with our determination that the Proposed Action is *not likely to adversely affect* protected species and we request your review of and comments on the attached Draft Environmental Assessment for this Proposed Action.

Please provide any comments or information within 45 days of the receipt of this correspondence to Christine Yott, ATTN: SPCS EA, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762-5157 or by email at NGB.A4.A4A.NEPA.COMMENTS.org@us.af.mil with the subject titled as ATTN: SPCS EA.

Sincerely

YOTT.CHRISTINE.JUNE.1287505015 Digitally signed by YOTT.CHRISTINE.JUNE.1287505015 Date: 2021.08.24 14:42:06 -04'00'

CHRISTINE J. YOTT, GS-13, DAF
NEPA Program Manager

Attachment: Description of Proposed Action and Alternatives

# IICEP Letter Attachments


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
PMRF-Barking Sands SPCS Site
N
0 50 100 200 300 400 500
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,


Legend
Joint Base Pearl Harbor-Hickam AFB SPCS Sites
N
0 125 250 500
Feet
Date: 11/17/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Andersen AFB SPCS Site Boundary
N
0
150
300
600
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

# Appendix A-3

# Responses to Scoping IICEP Letters

**From:** Lee, Charles TW on behalf of DOT AIR Visitor Information Program Office
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] RE: Scoping Letter for Space Control Squadron Beddown
**Date:** Tuesday, February 2, 2021 3:09:48 PM

Aloha Ms. Yott,
Thank you for your inquiry.
I have passed your email request to the Deputy Director's office and someone should be getting back to you shortly.

Mahalo

Chuck lee
DOTA Visitor Information Program

**From:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Sent:** Tuesday, February 2, 2021 8:07 AM
**To:** DOT AIR Visitor Information Program Office <dot.air.vip@hawaii.gov>
**Subject:** [EXTERNAL] Scoping Letter for Space Control Squadron Beddown

Hello,

The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.

Respectfully,

CHRISTINE J YOTT, M.S., DAF
NGB/A4AM Plans and Requirements
Physical Scientist (Environmental)
Air National Guard Readiness Center
3501 Fetchet Ave, Joint Base Andrews, MD 20762

| | |
|---|---|
| **From:** | Lusk, Keith (FAA) |
| **To:** | NGB A4/A4A NEPA COMMENTS Org |
| **Subject:** | [Non-DoD Source] ATTN: SPCS EA |
| **Date:** | Wednesday, February 17, 2021 1:45:42 PM |
| **Attachments:** | NGB Space Control Squadron basing actions.pdf |

We received the following input from the Federal Aviation Administration's (FAA) Honolulu Airports District Office (ADO).

The FAA is unable to provide comments at this time on the proposed Air National Guard, Space Control Squadron (SPCS) basing actions, SPCS #4 and SPCS #5 as requested in your letter on the subject dated January 29, 2021. Your letter did not provide descriptive information as to what facilities may be constructed at the three proposed locations nor what operations will be conducted at these facilities that would have allowed our agency to review the proposed project in total and to provide meaningful feedback.

One proposed location for a SPCS site (Attachment 2; Joint Base Pearl Harbor-Hickam AFB SPCS Site), would be located adjacent to the taxiway leading to the reef runway at the Daniel K. Inouye International Airport, Honolulu, Hawaii. You are advised that under Title 14 of the Code of Federal Regulations Part 77 your agency must submit information to the FAA so that our agency can analyze what potential effects the proposed construction and operation of the facility may have on the navigable airspace. This information is submitted to our agency on FAA Form 7460-1.

The FAA will be available to provide comments on the proposed project as more descriptive information is provided to our agency for review.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-6216-OE

Issued Date: 05/14/2021

Christine Yott
National Guard BUreau
3501 Fetchet Ave.
Joint Base Andrews, MD 20762

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

| | |
|---|---|
| Structure: | Building HIANG Facility |
| Location: | Honolulu, HI |
| Latitude: | 21-19-06.40N NAD 83 |
| Longitude: | 157-56-53.85W |
| Heights: | 15 feet site elevation (SE) |
| | 40 feet above ground level (AGL) |
| | 55 feet above mean sea level (AMSL) |

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 11/14/2022 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

Page 1 of 4

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (907) 271-5863, or robert.van.haastert@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-6216-OE.

**Signature Control No: 479300968-480781261** ( DNE )
Robert van Haastert
Supervisor

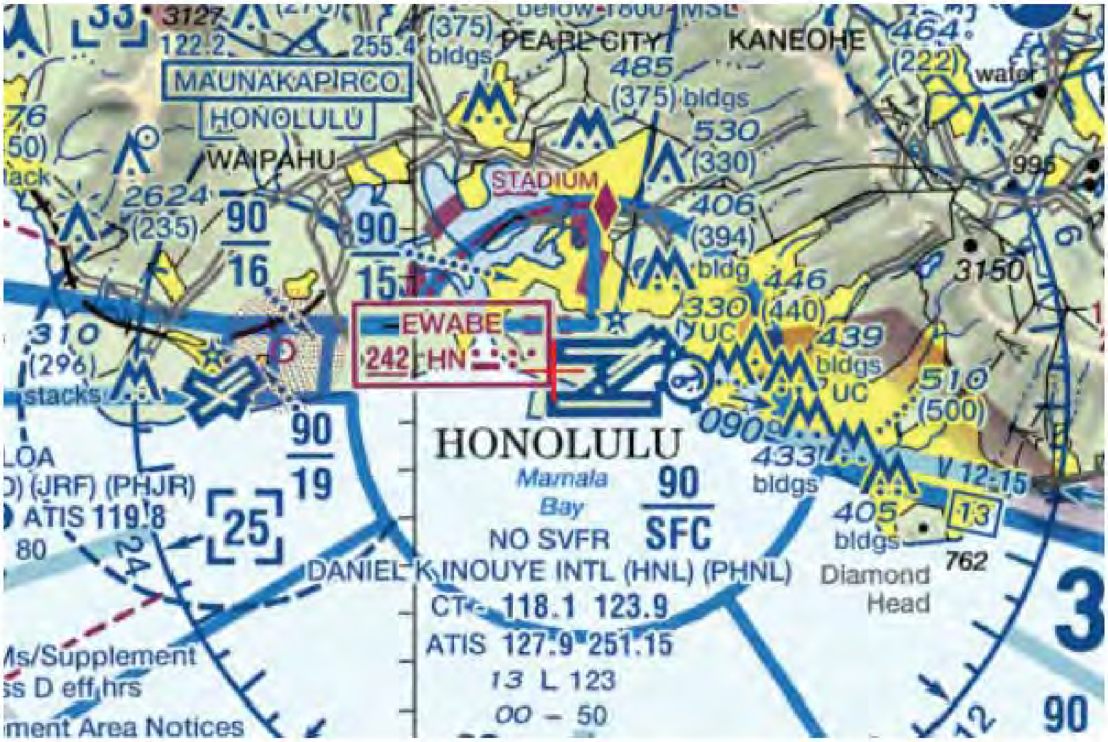
Attachment(s)
Map(s)

cc: FCC

TOPO Map for ASN 2021-AWP-6216-OE


Page 3 of 4

Sectional Map for ASN 2021-AWP-6216-OE




Page 4 of 4

*The Honorable*
**LOURDES A. LEON GUERRERO**
*Maga'Håga · Governor*

*The Honorable*
**JOSHUA F. TENORIO**
*Sigundo Maga' Låhi · Lieutenant Governor*

public works
DIPATTAMENTON CHE'CHO' PUPBLEKO
**VINCENT P. ARRIOLA**
*Director*
**JESSE G. GARCIA**
*Deputy Director*

February 11, 2021

Christine Yott
ATTN: SPCS EA
3501 Fetchet Avenue
Joint Base Andrews, MD 20762-5157

RE: Proposed Basing Actions (SPCS#4 and SPCS#5)

Dear Ms. Yott:

Hafa Adai! The Department of Public Works (DPW) is in receipt of your request dated January 29, 2021. The proposed action is for the United States Air Force to provide facilities and locations suitable for the establishment of two (2) Air National Guard locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission (SPCS #4) and one defensive mission (SPCS #5).

Based on our review, the DPW has determined that no impact specific to the mandates of our Agency will occur as a result of the proposed basing action. Additionally, the DPW is not aware of any proposed, on-going, or recently completed projects that could create or exacerbate impacts to the proposed action.

If you have any questions, please contact my office at 671-646-3131.

VINCENT P. ARRIOLA

CC: DPW Dep. Director
DPW COO

XX: Director's Chrono

542 North Marine Corps Drive, Tamuning, Guam 96913 • Tel (671) 646-3131 / 3232 • Fax (671) 649-6178

**From:** Brian Bearden
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown
**Date:** Sunday, February 7, 2021 5:48:43 PM

Received. I will forward to the offices within Guam EPA that need to review.

Very respectfully,

**CAPT Brian G. Bearden, MS, PE, BCEE**
US Public Health Service
Chief Engineer / Water Division Director
Guam Environmental Protection Agency
(671) 300-4779

On Wed, Feb 3, 2021 at 4:46 AM NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil> wrote:

> Hello,
>
> The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.
>
> Respectfully,
>
> CHRISTINE J YOTT, M.S., DAF
>
> NGB/A4AM Plans and Requirements
>
> Physical Scientist (Environmental)
>
> Air National Guard Readiness Center
>
> 3501 Fetchet Ave, Joint Base Andrews, MD 20762

| | |
|---|---|
| **From:** | Vera A. Topasna |
| **To:** | NGB A4/A4A NEPA COMMENTS Org |
| **Cc:** | Carol Perez |
| **Subject:** | [Non-DoD Source] ATTN: SPCS EA |
| **Date:** | Sunday, February 14, 2021 8:12:01 PM |

To Whom It May Concern:

I am in receipt of your letter dated January 29, 2021 regarding the proposed basing action at Andersen Air Force Base Guam. Hence, this email serves as a means to begin communications regarding your request for preliminary comments preceding the Environment Assessment (EA) as required by the National Environmental Policy Act (NEPA).

Please feel free to reach out to me via phone at any time. Also note, our office name and physical address has changed and is noted in the signature block below.

Sincerely,

***Vera Topasna***
Executive Director
Community Defense Liaison Office (CDLO)
Office of the Governor of Guam
120 Father Duenas Ave., Suite 104
Hagatna, Guam 96915
Office: 671-475-4735
Cell: 671-482-5946

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DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**
**LAND DIVISION**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

March 08, 2021

LD 0119

Christine Yott,
ATTN: SPCS EA *Via email: NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil*
3501 Fletcher Avenue
Joint Base Andrews, MD 20762-5157

Dear Isaiah:

SUBJECT: **Preliminary Agency Comments for Preparation of Environmental Assessment to Evaluate Feasibility of National Guard Bureau Proposed Action for Location of Basing Actions, Missions SPCS#4 and SPCS#5, at One of Three Candidate Locations (Kauai, Oahu, or Guam)**
Pacific Missile Range Facility, Island of Kauai; Joint Base Pearl Harbor-Hickam, Island of Oahu; or Anderson Air Force Base, Island of Guam

Thank you for the opportunity to review and comment on the subject project. The Land Division of the Department of Land and Natural Resources (DLNR) distributed copies of your request to various DLNR divisions, as indicated on the attached, for their review and comment.

Attached are comments received from our Engineering Division. Should you have any questions, please feel free to contact Barbara Lee via email at barbara.j.lee@hawaii.gov. Thank you.

Sincerely,

Russell Tsuji

Russell Y. Tsuji
Land Administrator

Attachments

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**
**LAND DIVISION**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

February 12, 2021

LD 0119

**MEMORANDUM**

FROM:

~~TO:~~ **DLNR Agencies:**
__Div. of Aquatic Resources *(via email: kendall.l.tucker@hawaii.gov)*
__Div. of Boating & Ocean Recreation
X Engineering Division *(via email: DLNR.Engr@hawaii.gov)*
X Div. of Forestry & Wildlife *(via email: Rubyrosa.T.Terrago@hawaii.gov)*
__Div. of State Parks
X Commission on Water Resource Management *(via email: DLNR.CWRM@hawaii.gov)*
__Office of Conservation & Coastal Lands
X Land Division – Oahu District *(via email: DLNR.Land@hawaii.gov)*

TO:

~~FROM:~~ Russell Y. Tsuji, Land Administrator *Russell Tsuji*

SUBJECT: **Preliminary Agency Comments for Preparation of Environmental Assessment to Evaluate Feasibility of National Guard Bureau (NGB) Proposed Action for Location of Basing Actions, Missions SPCS#4 and SPCS#5, at One of Three Candidate Locations (Kauai, Oahu, or Guam)**

LOCATION: Pacific Missile Range Facility, Island of Kauai; Joint Base Pearl Harbor-Hickam, Island of Oahu; or Andersen Air Force Base, Island of Guam

APPLICANT: **NGB with support from Environmental Assessment Services, LLC**

Transmitted for your review and comment is information on the above-referenced subject. Please submit any comments by **March 03, 2021** to DLNR.Land@hawaii.gov, and copied to barbara.j.lee@hawaii.gov and darlene.k.nakamura@hawaii.gov.

If no response is received by this date, we will assume your agency has no comments. If you have any questions, please contact Barbara Lee directly via email at barbara.j.lee@hawaii.gov. Thank you.

( ) We have no objections.
( ) We have no comments.
( ) We have no additional comments.
(✓) Comments are attached.

Signed: [signature]
Print Name: Carty S. Chang, Chief Engineer
Division: Engineering Division
Date: Feb 22, 2021

Attachments
Cc: Central Files

**DEPARTMENT OF LAND AND NATURAL RESOURCES**
**ENGINEERING DIVISION**

**LD/Russell Y. Tsuji**

**Ref: Preliminary Agency Comments for Preparation of Environmental Assessment to Evaluate Feasibility of National Guard Bureau (NGB) Proposed Action for Location of Basing Actions, Missions SPCS#4 and SPCS#5, at One of Three Candidate Locations (Kauai, Oahu, or Guam)**
**Location: Pacific Missile Range Facility, Island of Kauai; Joint Base Pearl Harbor-Hickam, Island of Oahu; or Andersen Air Force Base, Island of Guam**
**Applicant: NGB with support from Environmental Assessment Services, LLC**

**COMMENTS**

The rules and regulations of the National Flood Insurance Program (NFIP), Title 44 of the Code of Federal Regulations (44CFR), are in effect when development falls within a Special Flood Hazard Area (high risk areas). State projects are required to comply with 44CFR regulations as stipulated in Section 60.12. Be advised that 44CFR reflects the minimum standards as set forth by the NFIP. Local community flood ordinances may stipulate higher standards that can be more restrictive and would take precedence over the minimum NFIP standards.

The owner of the project property and/or their representative is responsible to research the Flood Hazard Zone designation for the project. Flood Hazard Zones are designated **on FEMA's Flood Insurance Rate Maps (**FIRM), which can be viewed on our Flood Hazard Assessment Tool (FHAT) (http://gis.hawaiinfip.org/FHAT).

If there are questions regarding the local flood ordinances, please contact the applicable County NFIP coordinating agency below:

- Oahu: City and County of Honolulu, Department of Planning and Permitting (808) 768-8098.
- Hawaii Island: County of Hawaii, Department of Public Works (808) 961-8327.
- Maui/Molokai/Lanai County of Maui, Department of Planning (808) 270-7253.
- Kauai: County of Kauai, Department of Public Works (808) 241-4896.

Signed: ______________________________
CARTY S. CHANG, CHIEF ENGINEER

Date: ______________________________

LDØ119

RECEIVED
LAND DIVISION
2021 FEB -5 PM 12: 38
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

**NATIONAL GUARD BUREAU**
3501 FETCHET AVENUE
JOINT BASE ANDREWS 20762-5157

RECEIVED
2021 FEB -4 AM 10: 29
DEPT. OF LAND NATURAL RESOURCES STATE OF HAWAII

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews, MD 20762

JAN 29 2021

Suzanne Case, Chairperson
Hawai'i Department of Land and Natural Resources
Kalanimoku Building, 1151 Punchbowl Street
Honolulu, HI 96813

Dear Chairperson Case,

The National Guard Bureau (NGB) is currently investigating the feasibility of completing two Air National Guard (ANG) Space Control Squadron (SPCS) basing actions, SPCS #4 and SPCS #5 at:

- Pacific Missile Range Facility (PMRF) – Barking Sands, HIANG 154th Wing (154 WG), located at Kauai, Hawaii (HI) (Attachment 1);
- Joint Base Pearl Harbor – Hickam (JBPHH), HIANG 154 WG, located at Honolulu, Oahu, HI (Attachment 2); or
- Andersen Air Force Base (AFB), Guam ANG (GUANG), 254th Wing (254 WG), located on Guam (Attachment 3).

The purpose of the Proposed Action is for the United States Air Force (USAF) to provide the facilities and locations suitable for the establishment of two ANG locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission (SPCS #4) and one defensive mission (SPCS #5). The Proposed Action rectifies the need to meet the 2015 Air Force Space Command Commander (AFSPC/CC) Air Reserve Component (ARC) Initiative priority to generate four additional ANG unit-equipped Unit Type Codes (UTCs) to meet Combatant Command (COCOM) needs for offensive space control. ANG SPCS #1, SPCS #2, and SPCS #3 were previously established to execute the offensive mission. SPCS #4 would accomplish this goal as it would provide for the fourth of four ANG SPCS offensive missions to be established. ANG SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet COCOM requirements for defensive space control. Currently, there is no defensive SPCS in the ANG. As directed by the National Environmental Policy Act (NEPA), the NGB, with support from Environmental Assessment Services, LLC, is preparing an Environmental Assessment (EA) in order to evaluate the potential environmental effects associated with the Proposed Action.

SPCS #4 and SPCS #5 would accommodate the offensive and defensive missions, respectively, and would be located at one of the three candidate locations identified above. Each SPCS would require the beddown of additional personnel in order to support the SPCS mission, including a sufficient number of ANG space operators and operations support personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, while SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission. Under the Proposed Action, facilities would be constructed in support of each SPCS. Each SPCS would require the modification of existing facilities or construction of new facilities in support of the basing action.

The NGB, 154 WG, and 254 WG are interested in information or agency-specific preliminary comments that would alleviate or highlight areas of concerns preceding this EA. Areas of concern may include potential effects to: physical, ecological, social, cultural, and archaeological resources. The NGB, 154 WG, and 254 WG also request any information that your agency may have regarding other proposed, ongoing, or recently completed projects that could create or exacerbate impacts to the Proposed Action.

Please respond within thirty (30) days of receipt of this letter to Christine Yott, ATTN: SPCS EA, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762-5157 or by email at NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil with the subject titled as ATTN: SPCS EA. Thank you for your assistance.

Sincerely

YOTT.CHRISTINE.JUNE.1287505015 Digitally signed by YOTT.CHRISTINE.JUNE.1287505015 Date: 2020.12.01 08:09:13 -05'00'

CHRISTINE J. YOTT, M.S., GS-13
Physical Scientist (Environmental)

3 Attachments:
1. PMRF – Barking Sands Project Location Map, October 2020
2. JBPHH Project Location Map, October 2020
3. Andersen AFB Project Location Map, October 2020


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
PMRF-Barking Sands SPCS Site
N
0 50 100 200 300 400 500
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,


Legend
Joint Base Pearl Harbor-Hickam AFB SPCS Sites
N
0 125 250 500 Feet
Date: 11/17/2020


Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Andersen AFB SPCS Site Boundary
N
0
150
300
600
Feet
Date: 10/22/2020
Map Extent
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**From:** Mayor Rick Blangiardi
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] Acknowledgment
**Date:** Friday, February 5, 2021 3:01:13 PM

Mahalo for your email to Mayor Rick Blangiardi.

Your views and concerns are important to us and we strive to address every message we receive. However, we ask for your patience as we receive many emails, phone calls, and letters each day. If your message is regarding a City service, we will direct it to the appropriate agency.

Thank you for your understanding.

Aloha,

Office of Mayor Rick Blangiardi
Honolulu Hale

**From:** Lemmo, Sam J
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] RE: Scoping Letter for Space Control Squadron Beddown
**Date:** Tuesday, February 2, 2021 6:33:47 PM

Thanks. Will take a look. Our only possible interest would be PMRF as this base is located on Conservation District Lands.

**From:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Sent:** Tuesday, February 2, 2021 8:08 AM
**To:** Lemmo, Sam J <sam.j.lemmo@hawaii.gov>
**Subject:** [EXTERNAL] Scoping Letter for Space Control Squadron Beddown

Hello,

The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.

Respectfully,

CHRISTINE J YOTT, M.S., DAF
NGB/A4AM Plans and Requirements
Physical Scientist (Environmental)
Air National Guard Readiness Center
3501 Fetchet Ave, Joint Base Andrews, MD 20762

**OFFICE OF PLANNING**
**STATE OF HAWAII**

235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824
Web: http://planning.hawaii.gov/

DTS 202102261806HE

March 8, 2021

Ms. Christine J. Yott, M.S., GS-13
3501 Fetchet Avenue
Joint Base Andrews, Maryland 20762-5157
ATTN: SPECS EA

Dear Ms. Yott:

Subject: National Guard Bureau Environmental Assessment for the Feasibility of two Air National Guard Space Control Squadron Basing Actions; Pacific Missile Range Facility, Barking Sands, Kauai; Joint Base Pearl Harbor Hickam, Oahu; and Anderson Air Force Base, Guam

Thank you for the opportunity to provide comments on this proposed action and its compatibility with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code 4321-4347), Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] Sections 1500-1508), and 32 CFR Part 989, et seq.

It is our understanding that the United States Air Force (USAF) proposes to find suitable locations for the establishment of two Air National Guard stations and develop facilities that will assist in the launching of geosynchronous satellites in the Pacific theater. These facilities will consist of one offensive mission - space control squadron (SPCS)#4 and one defensive mission - SPCS#5. The SPCS facilities are planned for locations in Hawaii and Guam.

The Office of Planning (OP) has reviewed the preliminary Environmental Assessment (EA) material and has the following comments to offer. Our comments are reserved for the two locations located within the State of Hawaii: Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai; and Joint Base Pearl Harbor – Hickam (JBPHH), Oahu.

1. Coastal Zone Management Area (CZMA) – Federal Consistency
   As the proposed action is offered by a federal agency, the USAF, this action may be subject to a CZMA federal consistency review. OP is the lead state agency with the authority to conduct CZMA federal consistency reviews. If you have any questions, please contact our office regarding this matter.

2. Climate Change / Sea Level Rise (SLR)
   Both the proposed PMRF Barking Sands and JBPHH SPCS sites are in close proximity to the coastlines of the islands of Kauai and Oahu respectively. These SPCS sites may be vulnerable to natural hazards such as inundation, storm surges, and coastal erosion typical

Christine J. Yott
March 8, 2021
Page 2

of coastal areas. Furthermore, these hazards are potentially exacerbated by the effects of climate change and SLR. Therefore, we recommend that the Environmental Assessment (EA) assess the vulnerability of these sites to SLR. A resource that may be used to evaluate climate change issues is the Hawaii SLR Vulnerability and Adaptation Report 2017 by the Hawaii Climate Change Mitigation and Adaptation Commission.

The Report, and Hawaii SLR Viewer at: https://www.pacioos.hawaii.edu/shoreline/slr-hawaii/ identifies various SLR exposure areas across the main Hawaiian Islands based on topography, land elevation, and proximity to the shoreline. The EA would benefit from the inclusion of a map of SLR exposure areas in relation to the two Hawaii based SPCS sites. The map should illustrate potential impacts from SLR, and consider site-specific mitigation measures.

3. <u>Stormwater Runoff, Erosion, and Water Resources</u>
   Pursuant to Title 40, Code of Federal Regulations (CFR) § 1501.3(b)(1) – in considering the potentially affected environment, agencies should consider, as appropriate to the specific action, the affected area (national, regional, or local) and its resources; to ensure that nearshore marine resources along the south shore of Oahu, and the Leeward Coast of Kauai remain protected, the negative effects of stormwater inundation and sediment loading near the proposed project site should be evaluated. Issues that may be examined include, but are not limited to, the project area's vulnerability to flood and erosion, potential susceptibility of water resources and the nearshore area, and intensification of stormwater runoff due to the increase of permeable surfaces caused by the development of the proposed action. Pursuant to 40 CFR § 1501.3(b)(2)(i), if necessary, mitigation for the negative effects caused by the proposed action in both the short and long term should be considered.

If you have any questions regarding this comment letter, please contact Joshua Hekekia of our office at (808) 587-2845 on NEPA EA matters, or John Nakagawa at (808) 587-2878 on CZMA federal consistency matters.

Sincerely,

Mary Alice Evans

Mary Alice Evans
Director

| | |
|---|---|
| **From:** | Lee, Barbara J |
| **To:** | NGB A4/A4A NEPA COMMENTS Org |
| **Subject:** | [Non-DoD Source] ATTN: SPCS EA |
| **Date:** | Friday, February 12, 2021 9:15:00 PM |
| **Attachments:** | LD0119 NGB.FeasibilityANG.SPCS#4+SPCS#5.PMRF+JBPH-H.Kauai+Oahu ReqLetter.pdf |

Greetings,

Thank you for your request for comments on the proposed project (attached).
We are disseminating your request to the appropriate divisions within the Department of Land and Natural Resources ("DLNR") for their review.
However, please note that we will no longer forward any projects to the State Historic Preservation Division ("SHPD"), as all applicants seeking **a historic/archeological review**, without exception, must establish an account and submit a separate request directly to SHPD through its new Hawai'i Cultural Resource Information System (HICRIS) online portal. SHPD's HICRIS website can be accessed at the following address:
https://dlnr.hawaii.gov/shpd/hicris/hawaii-cultural-resource-information-system-hicris/
If you have any questions about the historic review application process, please contact SHPD directly via the routes provided at the HICRIS website cited above.
Thank you.

***********************************
Barbara J Lee
Special Projects & Development Specialist
Land Division
Department of Land and Natural Resources
PO Box 621
Honolulu, HI 96809-0621
***********************************

DAVID Y. IGE
GOVERNOR OF HAWAII

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

**STATE OF HAWAII**
**DEPARTMENT OF HEALTH**
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:
**178895 SL**

February 25, 2021

Ms. Christine Yott
ATTN: SPC EA
3501 Fetchet Avenue
Joint Base Andrews, Maryland 20762-5157

**Facility/Site:** National Guard Space Control Center

**Subject:** Response to Letter Regarding Potential Air National Guard Space Control Squadron Basing Action at Two Hawaii Locations, received January 29, 2021

Dear Ms. Yott:

The Hawaii Department of Health (HDOH), Hazard Evaluation and Emergency Response (HEER) Office has reviewed the letter received January 29, 2021 regarding proposed Air National Guard (ANG) Space Control Squadron (SPCS) basing actions SPC #4 and SPCS #5 at two Hawaii locations: Pacific Missile Range Facility (PMRF) - Barking Sands and Joint Base Pearl Harbor-Hickam. The HEER Office reviewed the two proposed locations submitted as Attachment #1 and Attachment #2 and compared them to our records of sites with known environmental contamination.

Neither of the two sites are included in our records, although both PMRF and JBPHH have identified contamination at other areas of the properties. HDOH does not have regulatory jurisdiction over the third site at Andersen Air Force Base, Guam.

Should there be any questions, please do not hesitate to call me at (808) 586-5815, or contact me via e-mail at sven.lindstrom@doh.hawaii.gov.

Sincerely,

Sven Lindstrom
Voluntary Cleanup Program Specialist
Site Discovery, Assessment, and Remediation
Hazard Evaluation and Emergency Response Office
Hawaii Department of Health

DAVID Y. IGE
GOVERNOR OF HAWAII

ELIZABETH A. CHAR, M.D.
DIRECTOR OF HEALTH

**STATE OF HAWAII**
**DEPARTMENT OF HEALTH**
P. O. BOX 3378
HONOLULU, HI 96801-3378

In reply, please refer to:
File:

02005CEC.21

February 4, 2021

Ms. Christine J. Yott
Physical Scientist (Environmental)
NGB/A4AM Plans and Requirements
Air National Guard Readiness Center
3501 Fetchet Avenue
Joint Base Andrews, MD 20762

Dear Ms. Yott:

**Subject: Notice of Preparing Environmental Assessment (EA) for Inspection of the Feasibility of Completing Two (2) Air National Guard (ANG) Space Control Squadron (SPCS) Basing Actions, SPCS #4 and SPCS #5 at Pacific Missile Range Facility (PMRF), Barking Sands, Island of Kauai, Hawaii and Joint Base Pearl Harbor, Hickam (JBPHH), Island of Oahu, Hawaii**

Thank you for your letter signed on December 1, 2020, which was transmitted with your email of February 2, 2021 regarding the EA preparation for the subject projects. The Department of Health (DOH), Clean Water Branch (CWB) is no longer be responding directly to requests for comments/concerns on the following documents (Pre-consultation, Early Consultation, Preparation Notice, Draft, Final, Addendums, and/or Supplements):

- Environmental Impact Statements (EIS)
- Environmental Assessments (EA)
- Stream Channel Alteration Permits (SCAP)
- Stream Diversion Works Permits (SDWP)
- Well Construction/Pump Installation Permits
- Conservation District Use Applications (CDUA)
- Special Management Area Permits (SMAP)
- Shoreline Setback Areas (SSA)

For agencies or project owners requiring DOH-CWB comments/concerns for one or more of these documents, please utilize the DOH-CWB Standard Comments available on the DOH-CWB website located at: http://health.hawaii.gov/cwb/.

Ms. Christine J. Yott
February 4, 2021
Page 2

02005CEC.21

Should you have any questions, please contact Mr. Edward Chen of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

ALEC WONG, P.E., CHIEF
Clean Water Branch

EC

c: EHS, Kauai

DAVID Y. IGE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

JADE T. BUTAY
DIRECTOR

Deputy Directors
LYNN A.S. ARAKI-REGAN
DEREK J. CHOW
ROSS M. HIGASHI
EDWIN H. SNIFFEN

IN REPLY REFER TO:
DIR 0094
STP 8.3122

February 18, 2021

Ms. Christine J. Yott
Physical Scientist
National Guard Bureau
3501 Fetchet Avenue
Joint Base Andrews, Maryland 20762

Attention: SPCS EA

Dear Ms. Yott:

Subject: Pre-Consultation for Environmental Assessment (EA)
Feasibility of Completing Two Air National Guard (ANG) Space Control Squadron (SPCS) Basing Actions, SPCS #4 and SPCS #5 at
Pacific Missile Range Facility (PMRF) – Barking Sands
Joint Base Pearl Harbor – Hickam (JBPHH)
Anderson Air Force Base - Guam

Thank you for your letter dated January 29, 2021 which we received on February 3, 2021. The State of Hawaii Department of Transportation (HDOT) has reviewed the subject Pre-Consultation request from the National Guard Bureau and understands the Proposed Action is for the United States Air Force to provide the facilities and location to establish two ANG locations with access to geosynchronous satellites within the Pacific theater. The locations would consist of one offensive mission (SPCS #4) and one defensive mission (SPCS #5).

The Anderson Air Force Base location is outside of the State of Hawaii, and therefore HDOT has no comments to provide on that specific location.

The other two proposed locations at PMRF and JBPHH are military installations within the State of Hawaii and have access via roadways under HDOT jurisdiction. PMRF is accessed via Kaumualii Highway (State Route 50) and JBPHH is primarily accessed via Interstate H-1 and Nimitz Highway (State Route 92).

HDOT has the following comments:

Airports Division (HDOT-A)

1. The proposed site at JBPHH is located adjacent to existing Taxiway RB at the Daniel K. Inouye International Airport. All projects within five miles from Hawaii State airports are advised to read the Technical Assistance Memorandum (TAM) for guidance with development and activities that may require further review and permits. The TAM can

Ms. Christine J. Yott
February 18, 2021
Page 2

STP 8.3122

be viewed at this link: http://files.hawaii.gov/dbedt/op/docs/TAM-FAA-DOT-Airports_08-01-2016.pdf

2. Federal Aviation Administration (FAA) regulation requires the submittal of FAA Form 7460-1 Notice of Proposed Construction or alteration pursuant to the Code of Federal Regulations, Title 14, Part 77.9, if the construction or alteration is within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet. Construction equipment and staging area heights, including heights of temporary construction cranes, shall be included in the submittal. The form and criteria for submittal can be found at the following website: https://oeaaa.faa.gov/oeaaa/external/portal.jsp.

3. Currently, we do not know of any proposed, ongoing, or recently completed projects that could create or exacerbate impacts to the proposed site at JBPHH.

4. The proposed site at PMRF located on Kauai is not near any of HDOT-A's airports and, therefore, will have no impact upon HDOT-A facilities.

Highways Division (HDOT-HWY)

1. The HDOT-HWY has no jurisdiction over roadways within the military installations. It appears no construction is proposed within the State right-of-way (ROW); therefore, no direct impact to State roadways are anticipated. The Draft EA should document any new access gates or utility improvements required within the State ROW.

2. Although the increase in personnel commuting to each SPCS would be low, the Draft EA should assess the potential for indirect and cumulative effects to peak hour traffic conditions on State roadways that are used to access the installations.

3. The project description should include the number and schedule of trips generated during construction and operations at the installation access gate.

4. An HDOT-HWY permit is required to transport oversized equipment and overweight vehicles on HDOT-HWY roadways.

If there are any questions, please contact Mr. Blayne Nikaido of the HDOT Statewide Transportation Planning Office at (808) 831-7979 or via email at blayne.h.nikaido@hawaii.gov.

Sincerely,

JADE T. BUTAY
Director of Transportation

**From:** Mayor Rick Blangiardi
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] Acknowledgment
**Date:** Friday, February 5, 2021 3:01:13 PM

Mahalo for your email to Mayor Rick Blangiardi.

Your views and concerns are important to us and we strive to address every message we receive. However, we ask for your patience as we receive many emails, phone calls, and letters each day. If your message is regarding a City service, we will direct it to the appropriate agency.

Thank you for your understanding.

Aloha,

Office of Mayor Rick Blangiardi
Honolulu Hale

**OFFICE OF THE MAYOR**
**DEREK S.K. KAWAKAMI,** MAYOR
**MICHAEL A. DAHILIG,** MANAGING DIRECTOR

February 10, 2021

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave.
Joint Base Andrews, MD 20762

Dear Ms. Yott,

Thank you for your letter to Mayor Derek S.K. Kawakami and for the opportunity to comment on the feasibility of the National Guard Bureau completing two Air National Guard Space Control Squadron basing actions at the Pacific Missile Range Facility (PMRF) in Barking Sands, Kaua'i, which has been identified as a possible location.

Our understanding of the Proposed Action as presented in your letter is that the Space Control Squadron would be located on an existing site at PMRF, utilizing existing structures. Based on this understanding, we have no concerns about this proposal at this time.

We look forward to reviewing the National Guard Bureau's Environmental Assessment on the Proposed Action which will provide further information and analysis on potential effects associated with this proposal.

Sincerely,

Michael A. Dahilig
Managing Director, County of Kaua'i

CC: U.S. Senator Brian Schatz
U.S. Senator Mazie Hirono
U.S. Representative Kaiali'i Kahele
Major General Kenneth Hara

4444 Rice Street, Suite 235 • Lihu'e, Hawai'i 96766 • (808) 241-4900 (b) • (808) 241-6877 (f)
An Equal Opportunity Employer

**U.S. DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawaii 96818
(808) 725-5000 · Fax: (808) 725-5215

February 19, 2021

ATTN: SPCS EA
National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews, MD 20762

RE: Scoping Letter for Space Control Squadron Beddown

Ms. Yott:

We have reviewed your letter seeking information or comments that would highlight areas of concerns preceding this issuance of your proposed Environmental Assessment on the Proposed Action of completing two Air National Guard Space Control Squadron basing actions:

- Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, Hawaii (HI);
- Joint Base Pearl Harbor – Hickam at Honolulu, Oahu, HI; and
- Andersen Air Force Base Guam

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (ESA; 16 U.S.C. 1536(a) (2)) requires each federal agency to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. A list of ESA-listed nearshore species under NMFS' jurisdiction in the vicinity of the proposed activities is provided in Tables 1 and 2 below.

When a federal agency's action "may affect" a listed species or its designated critical habitat, that agency is required to consult formally with the National Marine Fisheries Service (NMFS) or the United States Fish and Wildlife Service (USFWS), depending upon the endangered species, threatened species, or designated critical habitat that may be affected by the action (50 CFR 402.14(a)). Federal agencies are exempt from this general requirement if they have concluded that an action "may affect, but is not likely to adversely affect" endangered species, threatened species or their designated critical habitat, and NMFS or USFWS concur with that conclusion (50 CFR 402.14 (b)(1)).

However, if you determine that these activities will not affect any ESA-listed species under NMFS jurisdiction, then no consultation is required. For example, if the proposed activities in the Action Area will occur upland, and will not affect any ESA listed aquatic species, or their designated critical habitats, then you have no obligation to consult with us.

Under the ESA, Action Area means all areas to be affected directly or indirectly by the proposed action, in which the effects of the action can be meaningfully detected, measured, and evaluated (50 CFR 402.02). An "effect" is defined by the ESA regulations to include a "consequence to listed species or critical habitat that is caused by the proposed action," and may include "the consequences of other activities that are caused by the proposed action." 50 CFR 402.02. A consequence is "caused by the proposed action" if "it would not occur but for the proposed action and it is reasonably certain to occur" (50 CFR 402.02; 402.17).

Based on the materials that you provided, the locations of the proposed activities appear adjacent to where species and critical habitat listed in Tables 1 and 2 may occur. However, we do not have enough information to advise you on the likelihood that the proposed activities may affect such species and critical habitat, but are happy to assist you in making such determinations.

If you ultimately determine that the proposed activities may affect the species and critical habitat in Tables 1 and 2, please submit a written request for consultation under section 7 of the ESA, and make effect determinations (i.e. "not likely to adversely affect" or "likely to adversely affect") for any ESA-listed species under NMFS' jurisdiction that may be affected by these activities (see Tables 1 and 2).

In your request, please provide: 1) an updated description of the action to be considered; 2) a description of the specific area that may be affected by the action; 3) a description of any listed species or critical habitat that may be affected by the action; 4) a description of the manner in which the action may affect any listed species or critical habitat and an analysis of any cumulative effects; 5) any relevant reports, including any environmental impact statement, environmental assessment, or biological assessment prepared; and 6) any other relevant available information on the action, the affected listed species, or critical habitat.

We are happy to answer any further questions you may have on this process.

If you have further questions, please contact Ron Dean at ron.dean@noaa.gov. Thank you for working with NMFS to protect our nation's living marine resources.

Sincerely,

GARRETT.ANN.M.1365883323 Digitally signed by GARRETT.ANN.M.1365883323 Date: 2021.02.18 15:30:02 -10'00'

Ann M. Garrett
Assistant Regional Administrator
Protected Resources Division

2

Table 1. For Main Hawaiian Island nearshore habitats. Common name, scientific name, ESA status, effective listing date, critical habitat designation, and recovery plans, with Federal Register reference for ESA-listed species considered in this consultation.

| **Species/ common name** | **ESA Status** | **Effective Listing Date/ FR Notice** |
|---|---|---|
| **Sea Turtles** | | |
| *Chelonia mydas* Central North Pacific Green Sea Turtle | Threatened | 05/06/2016 81 FR 20057 |
| *Eretmochelys imbricata* Hawksbill Sea Turtle | Endangered | 06/03/1970 35 FR 8491 |
| **Marine Mammals** | | |
| *Neomonachus schauinslandi* Hawaiian Monk Seal | Endangered | 11/23/1976 41 FR 51612 |

|Critical Habitat in the Action Area

In designated areas of the Main Hawaiian Islands (MHI), critical habitat for monk seals includes the marine environment with a seaward boundary that extends from the 200-m depth contour line (relative to mean lower low water), including the seafloor and all subsurface waters and marine habitat within 10-m of the seafloor, through the water's edge 5-m into the terrestrial environment. Detailed information on Hawaiian monk seal critical habitat can be found at https://www.fisheries.noaa.gov/species/hawaiian-monk-seal#conservation-management.

The specific areas within the designation, with their physical and biological features are:

1. Terrestrial areas preferred by monk seals for pupping and nursing with adjacent shallow, sheltered aquatic areas;
2. Marine areas from 0 to 200 m in depth that with water quality and sediment characteristics that support adequate prey quality and quantity for juvenile and adult monk seal foraging; and
3. Significant areas used by monk seals for hauling out, resting or molting.

3

Table 2. For Guam nearshore habitats. Common name, scientific name, ESA status, effective listing date, critical habitat designation, and recovery plans, with Federal Register reference for ESA-listed species considered in this consultation.

| **Species/ common name** | **ESA Status** | **Effective Listing Date/ FR Notice** |
|---|---|---|
| **Corals** | | |
| *Acropora globiceps* | Threatened | 09/10/2014<br>79 FR 53852 |
| *Acropora retusa* | Threatened | 09/10/2014<br>79 FR 53851 |
| *Seriatopora aculeata* | Threatened | 09/10/2014<br>79 FR 53851 |
| **Sea Turtles** | | |
| *Chelonia mydas*<br>Central West Pacific Green sea turtle | Endangered | 04/06/2016<br>81 FR 20057 |
| *Eretmochelys imbricata*<br>Hawksbill sea turtle | Endangered | 06/02/1970<br>35 FR 8491 |

4

**From:** Shad Kane
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** RE: [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown
**Date:** Tuesday, February 2, 2021 3:33:30 PM

Like all request for consultation it must address the impacts to communities affected........shad kane. Hawiian Cjvic Clubs, Kapuaiwa AiMoku, Royal Order of Kamehameha

On Feb 2, 2021 10:25 AM, "NGB A4/A4A NEPA COMMENTS Org" <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil> wrote:

> Mahalo for your interest in this project. The National Guard Bureau is working to draft the Environmental Assessment for this project, which will provide more detail about its projected impacts (both positive and negative). Until then, please let me know if you have any questions/concerns that you would like to see discussed in the Environmental Assessment.
>
> Respectfully,
>
> Christine Yott
>
> **From:** Shad Kane <shadskane@gmail.com>
> **Sent:** Tuesday, February 2, 2021 1:53 PM
> **To:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
> **Subject:** [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown
>
> I am embarresed to say I do not totally understand the entire project. I can only say the civic clubs support the work of the National Guard. However it is important to make certain that those who live close the proposed projects are aware. Barking Sands is a distance away from residences so might not be a problem. However Hickam may be a concern to people who live in the area especially Aliamanu, Saltlake and the airport area. Sorry I cannot provide more...........shad
>
> On Tue, Feb 2, 2021 at 7:59 AM NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil> wrote:
>
> > Hello,
> >
> > The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base

Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.

Respectfully,

CHRISTINE J YOTT, M.S., DAF

NGB/A4AM Plans and Requirements

Physical Scientist (Environmental)

Air National Guard Readiness Center

3501 Fetchet Ave. Joint Base Andrews, MD 20762

**From:** Kai Markell
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown
**Date:** Thursday, February 4, 2021 10:40:57 AM

Aloha! Thank you... We will add this to our review and comment intake. Be well....

Sent from my Verizon, Samsung Galaxy smartphone
Get Outlook for Android

---

**From:** NGB A4/A4A NEPA COMMENTS Org
<NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Sent:** Thursday, February 4, 2021, 3:36 AM
**To:** Kai Markell
**Subject:** FW: Scoping Letter for Space Control Squadron Beddown

Good Morning,

It is my understanding from Ms. Alice Silbanuz that you are the appropriate POC for this review. We will update our POC list for the future. Please see the attachment.

Mahalo,

Christine

**From:** Alice Silbanuz <alices@oha.org>
**Sent:** Wednesday, February 3, 2021 8:54 PM
**To:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Subject:** [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown

Aloha,
OHA Compliance Manager Kai Markell is the proper person to address this matter. His email is kaim@oha.org. Mahalo.

Malama Pono.

Alice Malepeai Silbanuz
Interim Community Engagement Director
Office of Hawaiian Affairs - Paia Lono
560 N. Nimitz Hwy., Suite 200
Honolulu, HI 96817

**From:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Date:** Tuesday, February 2, 2021 at 9:19 AM
**To:** "alices@oha.org" <alices@oha.org>
**Subject:** Scoping Letter for Space Control Squadron Beddown

Hello,

The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.

Respectfully,

JENNIFER L. HARTY, M.A., RPA, GS-13, DAF
Cultural Resources Program Manager A4VN
Air National Guard Readiness Center
3501 Fetchet Avenue
Joint Base Andrews, MD 20762

**From:** Alice Silbanuz
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown
**Date:** Wednesday, February 3, 2021 8:54:12 PM

Aloha,
OHA Compliance Manager Kai Markell is the proper person to address this matter. His email is kaim@oha.org. Mahalo.

Malama Pono.

Alice Malepeai Silbanuz
Interim Community Engagement Director
Office of Hawaiian Affairs - Paia Lono
560 N. Nimitz Hwy., Suite 200
Honolulu, HI 96817

---

**From:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Date:** Tuesday, February 2, 2021 at 9:19 AM
**To:** "alices@oha.org" <alices@oha.org>
**Subject:** Scoping Letter for Space Control Squadron Beddown

Hello,

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Respectfully,

JENNIFER L. HARTY, M.A., RPA, GS-13, DAF
Cultural Resources Program Manager A4VN
Air National Guard Readiness Center
3501 Fetchet Avenue
Joint Base Andrews, MD 20762

**From:** NGB A4/A4A NEPA COMMENTS Org
**To:** Shad Kane
**Subject:** RE: [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown
**Date:** Tuesday, February 2, 2021 3:01:50 PM

Mahalo for your interest in this project. The National Guard Bureau is working to draft the Environmental Assessment for this project, which will provide more detail about its projected impacts (both positive and negative). Until then, please let me know if you have any questions/concerns that you would like to see discussed in the Environmental Assessment.

Respectfully,

Christine Yott

**From:** Shad Kane <shadskane@gmail.com>
**Sent:** Tuesday, February 2, 2021 1:53 PM
**To:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Subject:** [Non-DoD Source] Re: Scoping Letter for Space Control Squadron Beddown

I am embarresed to say I do not totally understand the entire project. I can only say the civic clubs support the work of the National Guard. However it is important to make certain that those who live close the proposed projects are aware. Barking Sands is a distance away from residences so might not be a problem. However Hickam may be a concern to people who live in the area especially Aliamanu, Saltlake and the airport area. Sorry I cannot provide more...........shad

On Tue, Feb 2, 2021 at 7:59 AM NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil> wrote:

> Hello,
>
> The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.
>
> Respectfully,
>
> CHRISTINE J YOTT, M.S., DAF
> NGB/A4AM Plans and Requirements
> Physical Scientist (Environmental)
> Air National Guard Readiness Center
> 3501 Fetchet Ave, Joint Base Andrews, MD 20762

**From:** Fluker, Kristi D POH
**To:** NGB A4/A4A NEPA COMMENTS Org
**Subject:** RE: Scoping Letter for Space Control Squadron Beddown
**Date:** Thursday, February 11, 2021 6:11:37 PM

Aloha Christine,

The DA Project Number for this project is POH-2021-00036.

Mahalo,

Kristi Fluker
Biologist/Regulatory Specialist
Honolulu District
U.S. Army Corps of Engineers
Building 230
Fort Shafter, Hawaii 96858-5440
Kristi.D.Fluker@usace.army.mil

**From:** Speerstra, Linda CIV USARMY CEPOH (USA) <Linda.Speerstra@usace.army.mil>
**Sent:** Wednesday, February 3, 2021 8:47 AM
**To:** Fluker, Kristi D POH <Kristi.D.Fluker@usace.army.mil>; NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil
**Subject:** FW: Scoping Letter for Space Control Squadron Beddown

Aloha Christine – thank you for reaching out to the Corps. We are in receipt of your request and I've assigned to Kristi Fluker. She will be reaching out to you with a project number. Linda

Linda Speerstra
Chief, Regulatory Office

**From:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Sent:** Tuesday, February 2, 2021 8:15 AM
**To:** CEPOH-RO, POH <CEPOH-RO@usace.army.mil>
**Subject:** Scoping Letter for Space Control Squadron Beddown

Hello,

The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.

Respectfully,

CHRISTINE J YOTT, M.S., DAF
NGB/A4AM Plans and Requirements
Physical Scientist (Environmental)
Air National Guard Readiness Center
3501 Fetchet Ave, Joint Base Andrews, MD 20762

**DEPARTMENT OF THE ARMY**
HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

April 30, 2021

SUBJECT: Proposed Construction of SPCS #4 and SPCS #5, Pacific Missile Range Facility, Joint Base Pearl Harbor, Anderson Air Force Base, Kauai & Oahu, HI and Guam, Department of the Army File No. POH-2021-00036

Ms. Christine Yott
ATTN: SPCS EA
3501 Fetchet Avenue
Joint Base Andrews, MD 20762-5157

Dear Ms. Yott:

The Honolulu District, U.S. Army Corps of Engineers (Corps), Regulatory Branch received your letter dated requesting consultation for the proposed Construction of SPCS #4 and SPCS #5, Pacific Missile Range Facility, Joint Base Pearl Harbor, Anderson Air Force Base, Kauai & Oahu, HI and Guam. Your request has been assigned Department of the Army (DA) file number POH-2021-00036. Please reference this number in all future correspondence with our office relating to this action.

Based on the limited information provided in regard to your proposed development project, the Corps is unable to determine if your project would be located in a jurisdictional waters of the United States (U.S.)

The Corps authorities are based on two laws: Section 404 of the Clean Water Act (33 U.S.C. 1344; "Section 404") and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403; "Section 10").

Section 404 of the Clean Water Act requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the U.S., including jurisdictional wetlands (33 U.S.C. 1344). The Corps defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Section 10 of the Rivers and Harbors Act of 1899 requires that a DA permit be obtained for structures or work in or affecting navigable waters of the U.S. (33 U.S.C. 403). Section 10 waters are those waters subject to the ebb and flow of the tide shoreward to the mean high water mark, and/or other waters identified by the Alaska District.

- 2 -

DA authorization is required if you propose to place dredged and/or fill material into waters of the U.S., including wetlands and/or perform work in navigable waters of the U.S.

To make a request for a jurisdictional determination, please visit our website at https://www.poh.usace.army.mil/Portals/10/docs/jurisdictionaldeterminations/JD%20Request%20form%20POH%20Nov%202016.pdf to obtain a Request for Corps Jurisdictional Determination form and contact information for submission. Please be advised that whether or not a DA permit is required for your proposed project, you are responsible for obtaining all other applicable Federal, state, or local authorizations required by law.

Thank you for your cooperation with the Honolulu District Regulatory Program. Should If you have any questions related to this determination, please contact me via e-mail at Kristi.D.Fluker@usace.army.mil. You are encouraged to provide comments on your experience with the Honolulu District Regulatory Office by accessing our web-based customer survey form at http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey. For additional information about our Regulatory Program, please visit our web site at http://www.poh.usace.army.mil/Missions/Regulatory.aspx.

Sincerely,

KDFluker

Kristi D. Fluker
Regulatory Specialist

**From:** Speerstra, Linda CIV USARMY CEPOH (USA)
**To:** Fluker, Kristi D POH; NGB A4/A4A NEPA COMMENTS Org
**Subject:** FW: Scoping Letter for Space Control Squadron Beddown
**Date:** Wednesday, February 3, 2021 2:08:30 PM
**Attachments:** Linda Speerstra.pdf

Aloha Christine – thank you for reaching out to the Corps. We are in receipt of your request and I've assigned to Kristi Fluker. She will be reaching out to you with a project number. Linda

Linda Speerstra
Chief, Regulatory Office

**From:** NGB A4/A4A NEPA COMMENTS Org <NGB.A4.A4A.NEPA.COMMENTS.Org@us.af.mil>
**Sent:** Tuesday, February 2, 2021 8:15 AM
**To:** CEPOH-RO, POH <CEPOH-RO@usace.army.mil>
**Subject:** Scoping Letter for Space Control Squadron Beddown

Hello,

The Air National Guard is seeking information or preliminary concerns regarding projects associated with an upcoming Environmental Assessment at our locations on Joint Base Pearl Harbor-Hickam, HI; Pacific Missile Range Facility (PMRF) – Barking Sands, Kauai, HI; and Andersen Air Force Base, Guam. Please see the attachment for more information.

Respectfully,

CHRISTINE J YOTT, M.S., DAF
NGB/A4AM Plans and Requirements
Physical Scientist (Environmental)
Air National Guard Readiness Center
3501 Fetchet Ave, Joint Base Andrews, MD 20762

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

March 2, 2021

Ms. Christine J. Yott
Physical Scientist, Environmental
National Guard Bureau
3501 Fetchet Avenue
Joint Base Andrews, Maryland 20762

Subject: Scoping Comments for the Space Control Beddown, Oahu and Kauai Counties, Hawaii, and Guam

Dear Ms. Yott:

The U.S. Environmental Protection Agency has reviewed the National Guard Bureau's Notice of Intent to prepare a Draft Environmental Assessment for the Space Control Beddown, as described in your letter signed on January 12, 2021. Our review and scoping comments are provided pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The National Guard Bureau proposes to locate two Space Control missions in two of three locations, including Joint Base Hickam on Oahu, Pacific Missile Range Facility Barking Sands on Kauai, in Hawaii, and on Andersen Air Force Base, Guam. The missions will include new facility construction at two of the three proposed sites and may include moving as many as 220 personnel and their families to these military locations. The missions will not include additional air operations.

The EPA offers the attached scoping comments and recommendations to the National Guard Bureau to consider when preparing the Draft Environmental Assessment, regarding aquatic resources, drinking water, flooding, base housing, and renewable energy opportunity.

We appreciate the opportunity to review this scoping notice and are available to discuss our comments. When the Draft Environmental Assessment is prepared for this proposed action and released for public review, please send an electronic copy to the e-mail address below. If you have questions, please contact me at (415) 972-3321 or appleton.zac@epa.gov.

Sincerely,

ZACHARIAH APPLETON

Zac Appleton
Environmental Review Branch

Enclosure: EPA's Detailed Comments

**U.S. EPA DETAILED COMMENTS ON THE SCOPING NOTICE FOR THE SPACE CONTROL BEDDOWN, MULTIPLE COUNTIES, HAWAII AND GUAM- MARCH 2, 2021**

**Aquatic Resources**

The proposed beddown will include disturbing ground and constructing new facilities adjacent to aquatic resources. The following recommendations are specific for the proposed beddown sites.

*Recommendations:*

Clean Water Act Section 404: The North Sidewinder Road site on Kauai is particularly adjacent to wetlands. The Hickam site on Oahu is near the Kumumauu Canal that drains into the Mamala Bay. We recommend the National Guard Bureau avoid discharge of dredged or fill material from the proposed sites, and if that impact is anticipated, to coordinate with the US Army Corps of Engineers to determine impacts to jurisdictional waters and determine if the project may require a Clean Water Act (CWA) Section 404 permit. The Clean Water Act Section 404(b)(1) Guidelines (Guidelines) at 40 CFR Part 230.10(a) state that "... no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." Fundamental to the Guidelines is the principle that no dredged or fill material can be discharged into the aquatic ecosystem unless it can be demonstrated that there is no less environmentally damaging practicable alternative that achieves an applicant's project purpose. Only the Least Environmentally Damaging Practicable Alternative (LEDPA) can be permitted under the Guidelines (40 CFR 230.10(a)).

To determine the LEDPA, the Guidelines call for an analysis that compares the total impact of each alternative, including direct, indirect, and cumulative impacts. Additionally, the project applicant must demonstrate that potential impacts to waters of the United States have been avoided and minimized to the maximum extent practicable (40 CFR 230.10(a) and 230.10(d)).

Clean Water Act Section 401: We recognize the proposed project may add impermeable surfaces and change drainage patterns to the project area for all the proposed sites, potentially impacting water quality in adjacent water bodies. We recommend the National Guard Bureau describe the existing National Pollutant Discharge Elimination System (NPDES) permits and stormwater controls that would cover the proposed changes to the on-base sites. We recommend the National Guard Bureau describe the mitigation measures committed to, to minimize runoff impacts to adjacent water bodies during construction.

**Drinking Water**

The proposed Andersen Air Force Base (AFB) site is located above the recharge area of the Northern Guam Lens Aquifer, a designated Sole-Source Aquifer under the Safe Drinking Water Act, Section 1424(e).

*Recommendations*

We recommend the National Guard Bureau consider EPA's Sole Source Aquifer Project Review questions when preparing the Draft Environmental Assessment. Describe all mitigation measures to avoid contaminating groundwater on Guam committed to for the purpose of this project location. Include any commitments relating to water conservation, leak detection, and other measures to protect groundwater between Andersen AFB and the Guam Waterworks Authority as they relate to the proposed Guam project site.

- https://19january2017snapshot.epa.gov/www3/region9/water/groundwater/ssa-pdfs/Sole-Source-Aquifer-Proj-Rvu-Info.pdf

**Flooding**
The Mamala Bay Drive site at Joint Base Hickam in Honolulu is in an area designated as Zone D for Area of Undetermined Flood Hazard by the Federal Emergency Management Agency's National Flood Insurance Program (NFIP). The proposed site is immediately surrounded by areas designated as AE and VE by the NFIP, amounting to a 1% annual chance of flooding, with a 26% chance of flooding over a 30-year period.

*Recommendation*:
We recommend the National Guard Bureau analyze the flood risk specific to the proposed Hickam site and if the site is selected, describe the flood mitigation measures the project will commit to, in the Environmental Assessment.

**Tsunami Evacuation**
We note that all of the Pacific Missile Range Facility Barking Sands and the Mana Plain up to the foothills are in a Tsunami Evacuation Zone.

*Recommendation*:
We recommend the National Guard Bureau describe in the Environmental Assessment the tsunami risk mitigation measures committed to for proposed site at PMRF Barking Sands.

- https://dod.hawaii.gov/hiema/public-resources/tsunami-evacuation-zone/

**Base Housing**
The proposed action will add up to 220 personnel to two of the proposed military base sites, and their families may join them. The Notice of Intent does not mention development of any supporting facilities. The Environmental Assessment should identify all supporting facilities to ensure potentially connected actions are included in the environmental impact analyses (40 CFR 1501.9(e)). The project description should identify needed housing, parking facilities, transportation improvements, drinking water and/or wastewater treatment facilities, and other utilities upgrades that would be associated with the project. Consistent with 40 CFR 1502.15, other planned actions should be identified.

*Recommendations*:
The Environmental Assessment should describe impacts that could occur later in time or at a distance from the project site and have a reasonably close causal relationship to the proposed action or alternatives. Clarify if the proposed sites have sufficient housing and additional support capacity for the personnel and families of the proposed action, and disclose if any additional housing or support projects are anticipated relating to this proposed action.

**Renewable Energy**
We note the military has already pursued renewable energy projects on many of these Pacific bases, including the Pacific Energy Assurance Renewables Laboratory micro-grid on Joint Base Pearl Harbor-Hickam. Renewable energy with in-situ energy storage can add operational resilience to the proposed action.

*Recommendation*:

2

We continue to encourage the military to add renewable energy capacity to the proposed action at all of the selected project sites.

3

**DEPARTMENT OF THE AIR FORCE**
**HEADQUARTERS 36TH WING (PACAF)**
**ANDERSEN AIR FORCE BASE GUAM**

08 April 2021

Amanda Murphy
Cultural Resource Manager
36 CES/CEV
Andersen AFB Guam
Unit 14007
APO AP 96543-4007

TO
Jeffrey Laitila
Environmental Flight Chief
36 CES/CEV
Andersen AFB Guam
Unit 14007
APO AP 96543-4007

FROM: 36 CES/CEV CRM

SUBJECT: MEMORANDUM FOR 36 CES/CEV RECORD Re: Lapsed Sec 106 Consultation, Space Control Squadron (SPCS) Beddown Environmental Assessment [AAFB No RCS/GSHPO RC 2021-0058]

References: (a) 36 CFR Part 800—PROTECTION OF HISTORIC PROPERTIES (incorporating amendments effective August 5, 2004)
(b) Class I Literature Review for the Space Control Squadron (SPCS) Beddown for the Fourth (SPSC #4) and Fifth (SPSC #5) Basing Actions, prepared by ASM Affiliate for Department of the Air Force.
(c) Dixon, B. and C. Walker 2011 Archaeological Investigations Conducted in Support of the Joint Guam Build-Up Environmental Impact Statement: Threshold Report No. 2. Cardno TEC Inc. Prepared for Department of the Navy, Naval Facilities Engineering Command.
(d) Welch, David J. 2010 Archaeological Surveys and Cultural Resource Studies on the Island of Guam in Support of the Joint Guam Build-Up Environmental Impact Statement. IARII 200713. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.
(e) Mohlman, Geoffrey 2018 Historic Inventory Survey, Andersen Air Force Base, Territory of Guam, Contract Number N62470-12-D-7008. SEARCH Project # 3791-16191F. Prepared for Department of the Navy, Naval Facilities Engineering Command Marianas.
(f) SEARCH 2015 Integrated Cultural Resources Management Plan for Andersen Air Force Base, Joint Region Marianas. Prepared for NAVFAC Marianas.

*Under the Privacy Act of 1974, you must safeguard all information, if required, reflected on this document and, if applicable, all attachments. Disclosure of information is IAW AFI 33-119, AFI 33-127, AFI 33-129, DoD 5400. 7-R/Air Force Supplement (Freedom of Information Act), AFI 33-332 (Privacy Act), AFI 33-219, and PL 93-579.*

On 8 March 2021, 36 CES/CEV Cultural Resources Manager, Amanda Murphy, facilitated a Section 106 consultation with the Guam State Historic Preservation Office (SHPO), including supplemental documentation, and requested concurrence with a determination of **No Historic Properties Affected** for the proposed undertaking. Guam SHPO failed to respond within 30 days and as a result, 6 April 2021 was noted as the consultation's formal completion date. Per 36 CFR 800.4 (d)(1) (i), *If the SHPO/THPO, or the Council, if it has entered the section 106 process, does not object within 30 days of receipt of an adequately documented finding, the agency official's responsibilities under section 106 are fulfilled* in the case of **No Historic Properties Affected** determinations.

The basis of the determination is as follows:

i. The area has been previously surveyed and inventoried during the Joint Guam Build Up and other base studies (Welch 2010; Dixon and Walker 2011; Mohlman 2018);
ii. No historic properties exist within the APE, and the area is currently devoid of structures;
iii. Aerial photos from 1953 and 1967 indicate several periods of complete grading, infrastructure build-up, and demolition in the APE;
iv. And the area is considered to be a low-probability area for archaeological sites based on the ICRMP (SEARCH 2015).

Following the lapsed 30-day deadline for a SHPO response, SHPO reentered the consultation process on 7 April 2021. Although, per 36 CFR 800.3(c)(4), Andersen Air Force Base CRM is not *required to reconsider previous findings or determinations* following the lapse of the deadline, SHPO concurred with AAFB's determination. It is the determination of the Cultural Resources Program Manager that we have now fulfilled our obligations per CFR 800.4 (a) through (c), and the project may proceed on the basis of the above-mentioned findings.

AMANDA MURPHY
Cultural Resource Manager
36th Civil Engineer Squadron

Attachments: (a) 8 Mar 21 Section 106 Consultation for Space Control Squadron (SPCS) Beddown Environmental Assessment [No RCS];
(b) 7 Apr 21 (rcvd) GSHPO Response/Concurrence, dtd 6 Apr 21

**Lourdes A. Leon Guerrero**
*Governor*
**Joshua F. Tenorio**
*Lt. Governor*

**Department of Parks and Recreation**
*Dipattamenton Plaset yan Dibuetsion*
Government of Guam
Director's Office, Parks and Recreation Divisions
#1 Paseo de Susana, Hagåtña, Guam 96910
P.O. Box 2950, Hagåtña, Guam 96932
(671) 475-6288; Facsimile (671) 477-0997
Guam Historic Resources Division
490 Chalan Palasyo, Agana Heights, Guam 96910
(671) 475-6294/6355; Facsimile (671) 477-2822

**Roque A. Alcantara**
*Director*
**Victor R. Villagomez**
*Deputy Director*

April 6, 2021

In reply refer to:
RC 2021-0558

Amanda L. Murphy
Archaeologist/ CRM AAFB
36 Civil Engineering Squadron
Environmental Flight
Unit 14007
APO AP 96943-4007

Subject: Section 106 Consultation – Space Control Squadron (SPCS) Beddown Environmental Assessment, Andersen Air Force Base, Guam; on Behalf of the Air National Guard Readiness Center (RCS Pending)

Dear Mrs. Murphy,

We reviewed the subject undertaking and agree there are no eligible sites within the APE. Based on the project description the approximately 12,000 square foot bed-down facility, utility connections, the 2,500 sq. yd. equipment pad including the 50-foot offset for security fencing; and the 2,500 sq. yd. parking lot will have no impact. The APE for the undertaking 8.86 acres.

Therefore, we concur with the determination of "No historic properties affected". However, the subject lot will be subject to 36 CFR 800.13 Post Review Discovery in the event of inadvertent discoveries.

Should you have any questions, please do not hesitate to contact Mr. John Mark Joseph, State Archaeologist at JohnMark.Joseph@dpr.guam.gov.

Sincerely,

Carlotta Leon Guerrero
Acting State Historic Preservation Officer

# Appendix A-4

# Agency Consultations

DAVID Y. IGE
GOVERNOR OF HAWAII

Department of Land and Natural Resources
State of Hawaii

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

August 31, 2021

IN REPLY REFER TO:
Project No.: 2021PR00933
Submission No.: 2021PR00933.001
Doc No.: 2108SH13
Archaeology

Jennifer Harty
Cultural Resources Program Manager
National Guard Bureau
3501 Fetchet Avenue
Joint Base Andrews 20762-5157
Email: Jennifer.Harty@us.af.mil

Electronic Transmittal Only, No Hard Copy to Follow

Dear Jennifer Harty:

SUBJECT: **National Historic Preservation Act (NHPA) Section 106 Review –**
**Initiation of Consultation and Request for Concurrence with the Effect Determination**
**Proposed Space Control Squadron Beddown**
**Hālawa and Moanalua Ahupuaʻa, ʻEwa and Kona District, Island of Oʻahu**
**Waimea Ahupuaʻa, Kona District, Island of Kauaʻi**
**TMK: (1) 1-1-001:001, (1) 1-1-002:015, (1) 9-9-001:013, and (4) 1-2-002:013**

The State Historic Preservation Division (SHPD) received a letter dated August 4, 2021 from the National Guard Bureau to initiate Section 106 consultation and to request the State Historic Preservation Officer's (SHPO's) concurrence with the effect determination for the Proposed Space Control Squadron Beddown project which may occur on the island of Kauaʻi or Oʻahu. The SHPD received this submittal on August 5, 2021. Accompanying the National Guard Bureau's letter is a "Class I Literature Review" prepared by ASM Affiliates; this report includes information and an Area of Potential Effects (APE) map at Andersen Air Force Base on Guam, which is outside the jurisdiction of the Hawaiʻi State Historic Preservation Officer.

The National Guard Bureau (NGB) is evaluating a proposed project for the creation of facilities and infrastructure for the Space Control Squadron (SPCS). The proposed NGB project has been determined a federal undertaking as defined in 36 CFR 800.16(y) therefore the proposed project is subject to compliance with Section 106 of the NHPA.

According to NGB's letter, there are two proposed locations in which the project may occur. The two locations are 1) the existing NGB compound at the Pacific Missile Range Facility (PMRF) – Barking Sands on the island of Kauaʻi and 2) the current Hickam Softball Field and an undeveloped parcel on Joint Base Pearl Harbor-Hickam (JBPHH) on the island of Oʻahu. The proposed site at PMRF-Barking Sands is currently developed and the majority of the site is paved. There is an existing building with office space that would be renovated and expanded as part of the proposed undertaking. The proposed site at JBPHH consists of the existing Hickam Softball Field and adjacent undeveloped parcel. There are no permanent structures at the proposed site.

The NGB project description submitted to HICRIS Project No. 2021PR00933 states that the Air Force is proposing to establish a Space Control Squadron (SPCS), requiring the construction or renovation of the following facilities a 12,100 $ft^2$ building that consists of 3,000 $ft^2$ of administration area, 3,600 $ft^2$ of operational area, 5,200 $ft^2$ of maintenance area, and 300 $ft^2$ of hazardous storage area. The one-story building is anticipated to have a maximum roofline height of 35 feet or less and an open floor plan with Secure Compartmentalized Information Facility space capable of accommodating personnel. The facility and equipment require Protection Level 3, a 5,000 $yd^2$ equipment

Jennifer Harty
August 31, 2021
Page 2

pad with an unobstructed view of geosynchronous satellites. Antennas would be anticipated to reach a maximum height of 35 feet or less. A 2,500 $yd^2$ parking lot within 0.25-mile of the facilities. A 50-ft security clearance setback throughout perimeter of equipment pad. An infiltration basin or approved Low Impact Development solution pursuant to Uniform Facilities Criteria 3-210-10, and a 50-ton air conditioner unit.

The NGB has defined the APE for this project as within the red boundaries illustrated on Figures 1 and 2 of the Class I Literature Review. The NGB states the specifications for structures within the APE have not yet been finalized due to the speculative stage of the project, however, it may be assumed that the project facilities will include an approximately 12,100-sq-ft beddown facility with utility connections, a 2,500-sq-yd equipment pad with a 50-ft offset for security fencing, and a 2,500-sq-yd parking lot.

The NGB states there are no eligible historic properties within the APE and the proposed ground disturbance at both PMRF-Barking Sands and JBPHH would occur within disturbed contexts. Therefore, NGB has reached a determination of *no historic properties affected* for the proposed undertaking.

**The SHPO does not concur** based on the need for additional information to support the effect determination. Please submit the following:

- Because the most recent study at PMRF was conducted over twenty years ago and because there is no archaeological data within, or adjacent to, the APE at JBPHH, the SHPD is requesting systematic Phase 1 subsurface testing at both proposed locations and an archaeological findings report. If Phase 1 subsurface testing is not feasible at the PMRF locations due to ongoing use of the facilities, please consult with the SHPD to determine an adequate testing strategy.
- Copies of the archaeological reports used in support of NGB's finding of effect.
- Please indicate whether the existing building at PMRF proposed for renovation is historical in age and if so, provide a significance and integrity assessment of the building.
- Copies, or a summary, of the NGB's consultation efforts with the public, native Hawaiian Organizations, and other potentially interested parties, any comments received, and the NGB's response to any comments received.

**Please submit** all forthcoming information and correspondence related to the subject project to the SHPD HICRIS system under Project 2021PR00933 using the Project Supplement option.

The SHPD looks forward to continuing the Section 106 process for the proposed project.

The NGB is the office of record for this undertaking. Please maintain a copy of this letter with your environmental review record.

Please contact Stephanie Hacker, Historic Preservation Archaeologist IV, at Stephanie.Hacker@hawaii.gov or at (808) 692-8046 for matters regarding archaeological resources or this letter.

Aloha,

*Alan Downer*
Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

**NATIONAL GUARD BUREAU**
**3501 FETCHET AVENUE**
**JOINT BASE ANDREWS 20762-5157**

2 December 2021

Dr. Alan Downer
Administrator
Hawaii State Historic Preservation Division
601 Kamokila Blvd, Suite 555
Kapolei, HI 96707

Dear Dr. Downer,

The National Guard Bureau (NGB) is in receipt of your letter dated 7 September 2021 responding to our determination of effects letter dated 4 August 2021. The purpose of this letter is to provide additional information and complete Section 106 consultation.

As stated in our original letter, are two proposed locations for the undertaking in Hawaii - the existing NGB compound at the Pacific Missile Range Facility (PMRF)-Barking Sands, Kaua'i, and the current Hickam Softball Field in an undeveloped parcel on Joint Base Pearl Harbor-Hickam (JBPHH), O'ahu. The following discussion provides additional information regarding our proposed undertaking:

**PMRF**

The proposed undertaking at PMRF-Barking Sands consists of upgrading Building 1115 and adding a 2000 $ft^2$ addition. Upgrades include a new electrical distribution system, lighting, fire protection system, roof and exterior envelope updates, interior finishes, restroom facilities, security, parking lot, sidewalks, and fencing. Other new construction would include a 300 $ft^2$ hazardous materials storage facility. All proposed work would occur within the existing fenced Hawaii Air National Guard PMRF facility.

NGB has determined the Area of Potential Effects (APE) for the proposed undertaking to consist of the proposed area of construction, access to the facility, and material laydown yards. The entirety of the APE is within an area previously surveyed for archaeological materials with none identified. Additionally, the APE has been disturbed from previous construction, leveling, fencing, landscaping, and paving activities. Building 1115 was constructed in 1995 and therefore does not meet the minimum qualifications for inclusion in the NRHP either under Criteria A-D or under Criterion Consideration G as a Cold War Asset.

The NGB, working with Navy personnel at PMRF, has reached a determination of *no historic properties affected* for the proposed undertaking for the PMRF location. Additionally, the proposed action falls under a Regional Programmatic Agreement signed by the Commander, Navy Region Hawaii; the Advisory Council on Historic Preservation; and the Hawaii State Historic Preservation Officer. The PA states that if Navy personnel determine that an undertaking does not have the potential to cause effects on listed, contributing, or eligible properties, no further review under the PA and the NHPA is required. As terms in the PA supersede standard consultation procedures outlined in Section 106 of the NHPA and implementing regulations (36 CFR Part 800), no further consultation with the Hawaii State Historic Preservation Office is required.

**JBPHH**

The proposed undertaking at JBPHH consists of constructing a new building in the existing Hickam Softball Field and adjacent undeveloped parcel. There are currently no permanent structures at the proposed site. Proposed construction at the site includes an approximately 15,000 $ft^2$ building and all associated utilities. All proposed construction work would occur within the area identified as fill.

NGB has determined the Area of Potential Effects (APE) for the proposed undertaking to consist of the proposed area of construction, access to the facility, and material laydown yards. The entirety of the APE is within an area built up with fill brought in to the area, as supported by data from the NRCS Soil Survey (Attachment 1).

The NGB, working with Navy personnel at JBPHH, has reached a determination of *no historic properties affected* for the proposed undertaking for the JBPHH location. Additionally, the proposed action falls under a Regional Programmatic Agreement signed by the Commander, Navy Region Hawaii; the Advisory Council on Historic Preservation; and the Hawaii State Historic Preservation Officer. The PA states that if Navy personnel determine that an undertaking does not have the potential to cause effects on listed, contributing, or eligible properties, no further review under the PA and the NHPA is required. As terms in the PA supersede standard consultation procedures outlined in Section 106 of the NHPA and implementing regulations (36 CFR Part 800), no further consultation with the Hawaii State Historic Preservation Office is required.

In the unlikely event of an inadvertent discovery during construction, the Hawaii Air National Guard would implement Standard Operating Procedures outlined in the *Integrated Cultural Resources Management Plan* established for JBPHH, or the existing NAGPRA Agreement for PMRF.

Thank you for taking the time to review our proposed undertaking. Please direct any further questions or requests for additional information to Jennifer Harty, Cultural Resources Program Manager, at jennifer.harty@us.af.mil.

Sincerely

JENNIFER L. HARTY, GS-13, DAF
Cultural Resources Program Manager

3 Attachments:
1. Project Location Map – PMRF – Barking Sands
2. Project Location Map – JBPHH
3. NRCS Soil Survey Map

2


Soil Map—Island of Oahu, Hawaii
(JBPHH)
Dump Rd
Drum Rd
Seamen Ave
Lagoon Dr
MnC
W
FL
FL
Map Scale: 1:24,000 if printed on A landscape (11" x 8.5") sheet.
Meters
0 350 700 1400 2100
Feet
0 1000 2000 4000 6000
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84
Natural Resources
Conservation Service
Web Soil Survey
National Cooperative Soil Survey
11/30/2021
Page 1 of 3

Soil Map—Island of Oahu, Hawaii
(JBPHH)

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Island of Oahu, Hawaii
Survey Area Data: Version 16, Sep 15, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

11/30/2021
Page 2 of 3

## Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| FL | Fill land, mixed | 29.6 | 91.3% |
| MnC | Mamala cobbly silty clay loam, 0 to 12 percent slopes, MLRA 163 | 1.0 | 3.2% |
| W | Water > 40 acres | 1.8 | 5.5% |
| **Totals for Area of Interest** | | **32.4** | **100.0%** |


Soil Map—Island of Oahu, Hawaii
(JBPHH)
HICKAM
AIR FORCE BASE
Control Tower
Athletic Field
Bishop Point
NAVAL RES
Pearl Harbor
Entrance
Hammer Point
Drum Rd
Dump Rd
EWA DISTRICT
HONOLULU DISTRICT
FORT KAMEHAMEHA
MnC
W
FL
WORCHESTER AVE
Seamen Ave
MILITARY RESERVATION
Golf Course
Lagoon Dr
Hickam Harbor
Rocks
Map Scale: 1:24,000 if printed on A landscape (11" x 8.5") sheet.
Meters
0 350 700 1400 2100
Feet
0 1000 2000 4000 6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84
Natural Resources Conservation Service
Web Soil Survey
National Cooperative Soil Survey
11/30/2021
Page 1 of 3

Soil Map—Island of Oahu, Hawaii
(JBPHH)

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Political Features**
- PLSS Township and Range

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Topographic Map
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Island of Oahu, Hawaii
Survey Area Data: Version 16, Sep 15, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

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USDA Natural Resources Conservation Service | Web Soil Survey National Cooperative Soil Survey | 11/30/2021 Page 2 of 3

## Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| FL | Fill land, mixed | 29.6 | 91.3% |
| MnC | Mamala cobbly silty clay loam, 0 to 12 percent slopes, MLRA 163 | 1.0 | 3.2% |
| W | Water > 40 acres | 1.8 | 5.5% |
| **Totals for Area of Interest** | | **32.4** | **100.0%** |

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
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DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**
STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD., STE 555
KAPOLEI, HI 96707

December 29, 2021

IN REPLY REFER TO:
Project No.: 2021PR00933
Doc. No.: 2112SH20
Archaeology
Architecture

Jennifer Harty
Cultural Resources Program Manager
National Guard Bureau
3501 Fetchet Avenue
Joint Base Andrews 20762-5157
Email: Jennifer.Harty@us.af.mil

Electronic Transmittal Only, No Hard Copy to Follow

Dear Jennifer Harty:

SUBJECT: **National Historic Preservation Act (NHPA) Section 106 Review –**
**Continued Consultation**
**Proposed Space Control Squadron Beddown**
**Hālawa and Moanalua Ahupuaʻa, ʻEwa and Kona District, Island of Oʻahu**
**Waimea Ahupuaʻa, Kona District, Island of Kauaʻi**
**TMK: (1) 1-1-001:001, (1) 1-1-002:015, (1) 9-9-001:013, and (4) 1-2-002:013**

The State Historic Preservation Division (SHPD) received a letter dated December 2, 2021 from the National Guard Bureau to provide the State Historic Preservation Officer (SHPO) with a notification for the Proposed Space Control Squadron Beddown project which may occur on the island of Kauaʻi or Oʻahu. The SHPD received this submittal on December 3, 2021 (Submission No. 2021PR00933.002).

The National Guard Bureau (NGB) initiated consultation with the SHPD in a letter dated August 4, 2021 for a project in which the NGB is evaluating a proposed project for the creation of facilities and infrastructure for the Space Control Squadron (SPCS). The proposed NGB project was determined a federal undertaking as defined in 36 CFR 800.16(y) therefore the proposed project is subject to compliance with Section 106 of the NHPA.

According to NGB's August 4, 2021 letter, there are two proposed locations in which the project may occur. The two locations are 1) the existing NGB compound at the Pacific Missile Range Facility (PMRF) – Barking Sands on the island of Kauaʻi and 2) the current Hickam Softball Field and an undeveloped parcel on Joint Base Pearl Harbor-Hickam (JBPHH) on the island of Oʻahu.

Within SHPD's HICRIS system the NGB states the Air Force is proposing to establish a Space Control Squadron (SPCS), requiring the construction or renovation of the following facilities: a 12,100 $ft^2$ building that consists of 3,000 $ft^2$ of administration area, 3,600 $ft^2$ of operational area, 5,200 $ft^2$ of maintenance area, and 300 $ft^2$ of hazardous storage area. The one-story building is anticipated to have a maximum roofline height of 35 feet or less, an open floor plan with Secure Compartmentalized Information Facility space capable of accommodating personnel. The facility and equipment require Protection Level 3, a 5,000 $yd^2$ equipment pad with an unobstructed view of geosynchronous satellites. Antennas would be anticipated to reach a maximum height of 35 feet or less. A 2,500 $yd^2$ parking lot within 0.25-mile of the facilities. A 50-ft security clearance setback throughout perimeter of equipment pad. An infiltration basin or approved Low Impact Development solution pursuant to Uniform Facilities Criteria 3-210-10, and a 50-ton air conditioner unit.

Jennifer Harty
December 29, 2021
Page 2

In a response letter dated August 31, 2021, the SHPO requested additional information. At this time the NGB has indicated the NGB, working with Navy personnel, have reached a determination of *no historic properties affected* for the proposed undertaking at the PMRF and JBPHH locations. Additionally, the NGB asserts the proposed action falls under a Regional Programmatic Agreement (PA) signed by the Commander, Navy Region Hawai'i; the Advisory Council on Historic Preservation; and the Hawai'i State Historic Preservation Officer. The NGB further asserts, that as terms in the PA supersede standard consultation procedures outlined in Section 106 of the NHPA and implementing regulations (36 CFR Part 800), no further consultation with the SHPO is required.

In addition to the information previously requested, **the SHPO requests** the following:

- Please indicate the title and year of the PA being applied and under which stipulation(s) the Navy has determined the PA applies.
- Please indicate which Navy personnel determined the PA applies.

**Please submit** all forthcoming information and correspondence related to the subject project to the SHPD to HICRIS Project No. 2021PR00933 using the Project Supplement option.

The NGB and the Navy are the offices of record for this undertaking. Please maintain a copy of this letter with your environmental review record.

Please contact Stephanie Hacker, Historic Preservation Archaeologist IV, at Stephanie.Hacker@hawaii.gov or at (808) 692-8046 for matters regarding archaeological resources or this letter.

Aloha,
*Susan A. Lebo*
Signed For
Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

NATIONAL GUARD BUREAU
3501 FETCHET AVENUE
JOINT BASE ANDREWS 20762-5157

19 November 2021

National Guard Bureau (NGB/A4AM)
Ms. Christine J. Yott
3501 Fetchet Ave
Joint Base Andrews MD 20762

Katherine Mullett
Field Supervisor
US Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd
PO Box 50088
Honolulu HI 96850-5000

**SUBJECT:** Seeking Concurrence on Determination for Proposed Space Control Squadron (SPCS) Beddown at Pacific Missile Range Facility (PMRF)-Barking Sands, Hawaii; Joint Base Pearl Harbor-Hickam (JBPHH), Hawaii; and Andersen Air Force Base (AFB), Guam

Dear Ms. Mullett

The National Guard Bureau (NGB) is developing a draft Environmental Assessment (EA) addressing the proposed beddown of two SPCSs at three candidate locations. The candidate locations are PMRF-Barking Sands, Hawaii; JBPHH, Hawaii; and Andersen AFB, Guam.

The beddown of a SPCS at these sites would provide the facilities and locations suitable for the establishment of an Air National Guard (ANG) unit with access to geosynchronous satellites in the Pacific theater. In accordance with Section 7 of the Endangered Species Act (ESA), NGB is requesting concurrence for our *not likely to adversely affect* determination for the proposed beddown of a SPCS at each proposed location. Note that PMRF and Andersen AFB are preferred alternatives; JBPHH is the reasonable alterantive.

**PMRF-Barking Sands, Hawaii**

*Threatened, Endangered, and Candidate Species and Critical Habitat*

A review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPac) site identified federally listed species with the potential to occur in the area of this proposed SPCS parcel. Construction activities associated with the Proposed Action would occur entirely within the boundaries of PMRF-Barking Sands in areas of existing developed land devoid of natural vegetation.

Federal- or State-listed endangered and threatened species observed on PMRF-Barking Sands (and surrounding areas) include the following:

| Scientific Name | Common Name | Federal Status | State Status |
|---|---|---|---|
| **Wildlife** | | | |
| *Anas wyvilliana* | Hawaiian duck | E | E |
| *Himantopus mexicanus knudensi* | Black-necked stilt | E | E |
| *Gallinula chloropus sandwichensis* | Hawaiian common gallinule/ moorhen | E | E |
| *Fulica Americana alai* | Hawaiian coot | E | E |
| *Asio flammeus sandwichensis* | Hawaiian short-eared owl | - | E |
| *Phoebastria albatrus* | Short-tailed albatross | E | E |
| *Drosophila musaphilia; Drosophila sharpi* | Hawaiian picture-wing flies | E | E |
| *Nesochen sandvinvensis* | Hawaiian goose (nene) | E | E |
| *Petrodroma phaeopygia sandwicense* | Hawaiian dark-rumped petrel | E | E |
| *Oceanodrama castro* | Band-rumped petrel | E | E |
| *Puffinus auricularis newelli* | Newell's shearwater | T | T |
| *Lasirus cinerus semotus* | Hawaiian hoary bat | E | E |

There is no critical habitat for listed species within the proposed SPCS PMRF-Barking Sands parcel. The Kawai'ele Waterbird Sanctuary is located in close proximity to this proposed SPCS PMRF-Barking Sands parcel but is separated from the site by the Kinikini Ditch.

*Determination of Effects of the Proposed Action*

- Hawaiian Short-Eared Owl, Short-Tailed Albatross, and Hawaiian Picture-Wing Flies

The Hawaiian short-eared owl, short-tailed albatross, and Hawaiian picture-wing flies are present in the vicinity but not known to occur on the SPCS PMRF-Barking Sands parcel. The NGB has determined that the Proposed Action will *not affect* these species at the SPCS PMRF-Barking Sand parcel because 1) these species are not known to occur on the parcel, 2) ground disturbance would occur in an area that is already paved and/or developed, and 3) no vegetation known to host these species will be cleared.

- Waterbirds

Waterbirds, including the Hawaiian duck, black-necked stilt, Hawaiian common gallinule, and Hawaiian coot, are present in the state-managed wetland adjacent to the SPCS PMRF-Barking Sands parcel. These birds may occasionally traverse other areas with trenches and standing water.

The NGB has determined that the Proposed Action is *not likely to adversely affect* waterbirds at the SPCS PMRF-Barking Sand parcel because 1) the parcel does not include standing water, 2) ANG will take precautions to prevent standing water in the rare instance that it may occur after a rain event, 3) base personnel will enforce speed limits, 4) ANG personnel and contractors will contact PMRF Natural Resources staff should any endangered birds be seen on the parcel, and 5) ANG will cease construction work within a 150-foot vicinity of a waterbird nest when the nest is within the SPCS PMRF-Barking Sands parcel fenceline.

*Current Standing Water Conditions.* Currently, the SPCS does not have standing water and ANG work on the SPCS parcel is not expected to produce standing water.

*Preventing Standing Water.* To ensure any ponding of water on the parcel is minimal, the ANG will check drainage inlets and outlets before and after storm events to remove any debris that would prevent water from flowing offsite. In the rare instance that standing water may occur, the ANG will employ a leaf blower or other such equipment to move the water. In addition and if needed, the ANG will place a tarp over the ponding water to remove any possible attraction to the area.

*Speed Limits.* Base personnel regularly enforce speed limits. The SPCS PMRF-Barking Sand parcel is 9 acres. A little over half of the parcel is paved, and the pavement is broken up by various obstacles (e.g., facilities, pads) that vehicles must drive around. Due to the size and design of the parcel, it is not possible for personnel to drive at high speeds. Vehicles must slow down significantly to turn into the parking lot, then they must maneuver around obstacles to get to parking spaces. Regardless, all project personnel will be trained on the presence of ESA-listed species on PMRF and the importance of adhering to posted speed-limits to avoid collision with protected wildlife species.

*Procedures if Waterbirds Come Onsite.* ANG will inform contractors and personnel of the potential presence of endangered waterbirds on site. If any endangered waterbirds are observed on site, ANG personnel and contractors will notify PMRF Natural Resources staff.

*Cease Work.* If a Hawaiian waterbird or Hawaiian goose nest is discovered within a radius of 46 m (150 ft) of proposed construction work, or a previously undiscovered nest is found within that radius after work begins, all outside work within that vicinity will cease immediately and the NGB will contact the PMRF Installation Environmental Program Director, the PMRF Natural Resource Manager, and USFWS for further guidance. Work within the secure fence does not have to cease because there will already be a physical barrier between workers and the bird nest.

- Hawaiian Hoary Bat

The Hawaiian hoary bat is present in the vicinity and may fly through the SPCS PMRF-Barking Sands parcel. The bat can be harmed by flying into barbed wire. For the SPCS parcel, the only fence that we expect to have barbed wire is the restricted area fence line contained within the existing fence.

The NGB has determined that the Proposed Action is *not likely to adversely affect* the Hawaiian hoary bat at the SPCS PMRF-Barking Sand parcel because 1) calculated take is less than one bat and 2) there is only one tree within the fenced compound that will be removed and it is unlikely to host the bat.

*Calculated Take.* The fence with barbed wire is estimated to be 640 feet. If there are three strands of barbed wire on top, this would be 1,920 feet of barbed wire. Using the formula to calculate take, this is 0.3636/mile x 0.013 x 30 years = 0.1418. This number is below the threshold that constitutes a take.

*Tree Unlikely to Host Bats.* The SPCS parcel has one tree that will be removed. The tree is decorative, in a developed area, and no other trees are on the parcel. Bats are known to roost in forested areas, not in a lone tree on developed land. Additionally, the tree is sickly. Therefore, the tree to be removed is not expected to host bats. Out of an abundance of caution, the tree will not be removed during the Hawaiian hoary bat pupping season (June 1 to September 15).

- Hawaiian Seabirds

Hawaiian seabirds, including the Hawaiian dark-rumped petrel, Band-rumped petrel, and Newell's shearwater, are present in the vicinity and may fly through the SPCS PMRF-Barking Sands parcel. The birds are crepuscular and nocturnal and, thus, disoriented by light that can cause them to collide into objects.

The NGB has determined that the Proposed Action is *not likely to adversely affect* the Hawaiian seabirds at the SPCS PMRF-Barking Sand parcel because 1) construction would only occur during daylight hours, 2) the ANG will comply with the Dark Skies Program, 3) lighting will be designed to reduce impacts, and 4) ANG personnel and contractors will participate in seabird education programs.

*Construction Timing.* Any construction during the nocturnal seabird fledgling period (mid-September through mid-December) would occur only during daylight hours.

*Dark Skies Program.* The ANG will comply with the annual mid-September to mid-December Dark Skies program by a) only using lighting at night if required for Force Protection or safety and b) using shades to prevent indoor lighting at windows from being visible to birds outside.

*Lighting Design Plan.* The ANG will utilize a lighting design plan that focuses outside lighting downward (fully shielded so that the bulb can only be seen from below bulb height); installs motion sensors on outdoor lights that turn off when human activity is not occurring in the lighted area; and uses the appropriate colored bulbs for all outside structures, towers, and electrical distribution lines.

*Education Program.* ANG will coordinate with PMRF's Natural Resources staff to ensure an annual seabird brief is given to all SPCS contractors and personnel. All personnel will receive on-site training to ensure understanding of PMRF's natural resource policies and wildlife protection regulations and protocols. Training will include established PMRF

Environmental Management Policies and guidelines including "Nene Guidelines for PMRF Operations", "Good Samaritan Hazing" training for nene, "PMRF 2019 Dark Skies Program Briefing & Natural Resources Training", "Environmental Orientation for MDA Personnel", and "Shearwater Fallout Instructions" (materials available upon request).

- Nene

The nene is known to occur on the SPCS PMRF-Barking Sands parcel, including on the grassy area and in the parking lot. The birds lay their eggs in the open grass.

The NGB has determined that the Proposed Action is *not likely to adversely affect* the nene at the SPCS PMRF-Barking Sand parcel because 1) ANG will use a mowing plan to limit nene on the parcel, 2) ANG personnel and contractors will participate in education programs, 3) ANG personnel and contractors will not interact with nene, 4) base personnel will enforce speed limits, 5) ANG personnel and contractors will contact PMRF Natural Resources staff should any endangered birds be seen on the parcel, and 6) ANG will cease construction work within a 150-foot vicinity of a nene nest when the nest is within the SPCS PMRF-Barking Sands parcel fenceline.

*Mowing Plan.* Develop a mowing plan to ensure vegetation does not grow to a height that is attractive to the nene for nesting.

*Education Program.* ANG will coordinate with PMRF's Natural Resources staff to ensure an annual seabird brief is given to all SPCS contractors and personnel. All personnel will receive on-site training to ensure understanding of PMRF's natural resource policies and wildlife protection regulations and protocols. Training will include established PMRF Environmental Management Policies and guidelines including "Nene Guidelines for PMRF Operations", "Good Samaritan Hazing" training for nene, "PMRF 2019 Dark Skies Program Briefing & Natural Resources Training", "Environmental Orientation for MDA Personnel", and "Shearwater Fallout Instructions" (materials available upon request).

*Nene Interaction.* ANG personnel and contractors will not approach, feed, or otherwise disturb nene.

*Speed Limits.* Base personnel regularly enforce speed limits. The SPCS PMRF-Barking Sand parcel is 9 acres. A little over half of the parcel is paved, and the pavement is broken up by various obstacles (e.g., facilities, pads) that vehicles must drive around. Due to the size and design of the parcel, it is not possible for personnel to drive at high speeds. Vehicles must slow down significantly to turn into the parking lot, then they must maneuver around obstacles to get to parking spaces. Regardless, all project personnel will be trained on the presence of ESA-listed species on PMRF and the importance of adhering to posted speed-limits to avoid collision with protected wildlife species.

*Procedures if Nene Observed.* If nene are observed loafing or foraging within the project area during the breeding season (September through April), a biologist familiar with the nesting behavior of nene will survey for nests in and around the construction area prior to the resumption of any construction work. Repeat surveys after any subsequent delay of work of three or more days (during which the birds may attempt to nest).

*Cease Work.* If a Hawaiian waterbird or Hawaiian goose nest is discovered within a radius of 46 m (150 ft) of proposed work, or a previously undiscovered nest is found within that radius after work begins, all outside construction work within that vicinity will cease immediately and the NGB will contact the PMRF Installation Environmental Program Director, the PMRF Natural Resource Manager, and USFWS for further guidance. Construction work within the secure fence does not have to cease because there will already be a physical barrier between workers and the bird nest.

**JBPHH, Hawaii**

*Threatened, Endangered, and Candidate Species and Critical Habitat*

A review of the USFWS IPaC site identified federally listed species with the potential to occur in the area of this proposed SPCS JBPHH parcel. Construction activities associated with the Proposed Action would occur entirely within the boundaries of the SPCS JBPHH parcel in areas of existing developed land devoid of natural vegetation.

There is no critical habitat for listed species within the proposed SPCS JBPHH parcel. Federal- or State-listed endangered and threatened species observed on JBPHH (and surrounding areas) include the following:

| Scientific Name | Common Name | Federal Status | State Status |
|---|---|---|---|
| **Wildlife** | | | |
| *Anas wyvilliana* | Hawaiian duck | E | E |
| *Gallinula chloropus sandwichensis* | Hawaiian common gallinule/ moorhen | E | E |
| *Fulica Americana alai* | Hawaiian coot | E | E |
| *Asio flammeus sandwichensis* | Hawaiian short-eared owl | - | E |
| *Lasirus cinerus semotus* | Hawaiian hoary bat | E | E |

*Determination of Effects of the Proposed Action*

- Hawaiian Short-Eared Owl

The Hawaiian short-eared owl is present in the vicinity but not known to occur on the SPCS JBHH parcel. The NGB has determined that the Proposed Action will *not affect* this species at the SPCS JBPHH parcel because 1) this species is not known to occur on the parcel and 2) ground disturbance would occur in an area devoid of native vegetation.

- Waterbirds

Waterbirds, including the Hawaiian duck, Hawaiian common gallinule, and Hawaiian coot, have potential to occur on the SPCS JBPHH parcel. These birds may occasionally traverse areas with trenches and standing water.

The NGB has determined that the Proposed Action is *not likely to adversely affect* waterbirds at the SPCS JBPHH parcel because 1) the parcel does not include standing water, 2) ANG will take precautions to prevent standing water in the rare instance that it may occur after a rain event, 3) base personnel will enforce speed limits, 4) ANG personnel and contractors will contact JBPHH Natural Resources staff should any endangered birds be seen on the parcel, and 5) ANG will cease construction work within a 150-foot vicinity of a waterbird nest. See information in the PMRF-Barking Sands waterbird section. Each of those measures will apply to the SPCS JBPHH parcel.

- Hawaiian Hoary Bat

The Hawaiian hoary bat is present in the vicinity and may fly through the SPCS JBPHH parcel. The bat can be harmed by flying into barbed wire. For the SPCS parcel, the only fence that we expect to have barbed wire is the restricted area fence line contained within the existing fence.

The NGB has determined that the Proposed Action is *not likely to adversely affect* the Hawaiian hoary bat at the SPCS JBPHH parcel because 1) calculated take is less than one bat and 2) we do not expect any tree removal.

*Calculated Take.* JBPHH is not the preferred alternative for SPCS beddown. Therefore, no formal design is available at this time should JBPHH be selected. However, broadly speaking, the fence with barbed wire is expected to be about the same length as that of PMRF-Barking Sands (about 640 feet). If there are three strands of barbed wire on top, this would be 1,920 feet of barbed wire. Using the formula to calculate take, this is 0.3636/mile x 0.013 x 30 years = 0.1418. This number is below the threshold that constitutes a take.

*No Tree Removal.* The trees onsite are in a developed area. Bats are known to roost in forested areas, not in trees on developed land. Therefore, the trees are not expected to host bats. Additionally, ANG currently does not plan to remove any trees should JBPHH be selected for SPCS beddown. Out of an abundance of caution, if plans change and trees are to be removed, they will not be removed during the Hawaiian hoary bat pupping season (June 1 to September 15).

**Andersen AFB, Guam**

*Threatened, Endangered, and Candidate Species and Critical Habitat*

A review of the USFWS IPaC site identified federally listed species with the potential to occur in the area of this proposed SPCSAndersen AFB parcel. Construction activities associated with the Proposed Action would occur entirely within the boundaries of Andersen AFB in areas of existing developed land devoid of natural vegetation.

Federal- or Guam-listed endangered and threatened species observed on Andersen AFB (and surrounding marine areas) include the following:

| Scientific Name | Common Name | Federal Status | Guam Status |
|---|---|---|---|
| **Wildlife** | | | |
| *Pteropus mariannus* | Mariana fruit bat | T | E |
| *Gallinula chloropus guami* | Mariana common moorhen | E | E |
| *Aplonis opaca* | Micronesian starling | - | E |
| *Eretmochelys imbricate* | Hawksbill turtle | E | E |
| *Chelonia mydas* | Green sea turtle | E | E |
| *Emoia atrocostata* | Tide-pool skink | - | E |
| *Emoia cyanura* | Azure-tailed skink | - | E |
| *Emoia slevini* | Slevin's skink | E | E |
| *Lipinia noctua* | Moth skink | - | E |
| *Nactus pelagicus* | Pacific slender-toed gecko | - | E |
| *Perochirus ateles* | Micronesian gecko | - | E |
| *Partula gibba* | Humped tree snail | E | E |
| *Partula radiolata* | Guam tree snail | E | E |
| *Hypolimnas octocula marianesis* | Mariana eight-spot butterfly | E | - |

There is no critical habitat for listed species within the proposed SPCS Andersen AFB parcel. The closest area identified as sensitive habitat is the Pati Point Marine Preserve Area, which is approximately 0.5-mile from this proposed SPCS parcel.

*Determination of the Effects of the Proposed Action*

- Mariana Fruit Bat

The Mariana fruit bat is present in the vicinity and may fly through the SPCS Andersen AFB parcel. The bat can be harmed by removal of tree habitat during pupping season and flying into barbed wire.

The NGB has determined that the Proposed Action is *not likely to adversely affect* the Mariana fruit bat at the SPCS Andersen AFB parcel because 1) designs do not include barbed wire and 2) we do not expect any tree removal.

*No Barbed Wire.* The SPCS Andersen AFB design does not include barbed wire. Therefore, there would be no take from collision with barbed wire.

*No Tree Removal.* The trees onsite are in a developed area. Bats are known to roost in forested areas, not trees on developed land. Therefore, the trees are not expected to host bats.

Out of an abundance of caution, any planned tree removal will occur outside the Mariana fruit bat pupping season (June 1 to September 15).

- Micronesian Starling

The Micronesian starling is the only listed species with the potential to occur on the proposed SPCS Anderson AFB parcel; however, this species has not been identified on the property. No formal surveys have been conducted in support of the Proposed Action. Endemic to the Mariana Islands, the Micronesian starling is only found in three known locations on Guam and prefer to nest and roost in colonies within caves. Due to the developed nature of this proposed SPCS parcel, the NGB has determined that the Proposed Action is *not likely to adversely affect* the Micronesian starling.

- Remaining Species

The remaining listed species are present in the vicinity but not known to occur on the SPCS Andersen AFB parcel. The NGB has determined that the Proposed Action will *not affect* these species at the SPCS Andersen AFB parcel because 1) these species are not known to occur on the parcel and 2) ground disturbance would occur in an area devoid of native vegetation.

**Concurrence Request**

We request your concurrence with our determination that the Proposed Action is *not likely to adversely affect* protected species. Please provide any comments or information within to Christine Yott, ATTN: SPCS EA, 3501 Fetchet Avenue, Joint Base Andrews, MD 20762-5157 or by email at christine.yott.1@us.af.mil with the subject titled as ATTN: SPCS EA.

Sincerely

YOTT.CHRISTINE.JUNE.1287505015 Digitally signed by YOTT.CHRISTINE.JUNE.1287505015 Date: 2021.11.19 09:54:49 -05'00'

CHRISTINE J. YOTT, GS-13, DAF
NEPA Program Manager

**From:** Kwon, James <james_kwon@fws.gov>
**Sent:** Thursday, August 26, 2021 11:58 PM
**To:** YOTT, CHRISTINE J GS-13 USAF ANG ANGRC/A4 <christine.yott.1@us.af.mil>
**Cc:** STRICKLAND, WILLIAM K USAF ANGRC NGB/A4 <william.strickland.7@us.af.mil>; ASKINS, JASON T Maj USAF ANG NGB/A4AD <jason.askins@us.af.mil>; FRISCH, MELANIE A USAF ANG NGB/A7 <melanie.frisch@us.af.mil>
**Subject:** [Non-DoD Source] Re: [EXTERNAL] Additional info for consultation on ANG's facility at PMRF

Dear Christine,

Thank you for providing additional information on the project description and action area. On last week's call, we also discussed measures to avoid and minimize impacts to T&E species and the analysis of effects for each species. We ask that you address several remaining items:

1) The following species may occur within or transit the proposed action area: the endangered Hawaiian petrel (*Pterodroma sandwichensis*); endangered Hawaii Distinct Population Segment of the band-rumped storm-petrel (*Oceanodroma castro*); endangered Hawaiian black-necked stilt (*Himantopus mexicanus knudseni*); endangered Hawaiian moorhen (*Gallinula chloropus sandvicensis*); endangered Hawaiian coot (*Fulica alai*); endangered Hawaiian duck (*Anas wyvilliana*); threatened Hawaiian goose (*Branta sandvicensis*); endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*); and the threatened Newell's shearwater (*Puffinus auricularis newelli*). Please confirm that these are the species you are requesting our concurrence on.

2) Include the specific measures into your project description to avoid and minimize impacts

of your action on threatened and endangered species. Similar to lighting specifications and guidelines and "personnel education about species" to avoid and minimize potential impacts on seabirds, specific details should also be included for the Hawaiian goose and endangered waterbird species. Your August 2021 letter mentions stipulations of the 2014 BO which are not specified. I've attached our recommended measures for these species. In addition, a number of Hawaiian geese have been struck by vehicles in and around the HIANG facility, thus, we would recommend measures such as speed limits, signage, educational materials, and coordination with PMRF Natural Resources staff.

3) Please describe the potential impacts of barbed wire on the endangered Hawaiian hoary bat using the formulae below:
Total barbed wire = [Miles of fence] x [Number of strands of barbed wire > 3 feet above ground]
Estimated bat take = [Total barbed wire] x [0.013 Bats killed per mile of fence per year] x [Anticipated life of project]

4) An analysis of effects of the action on <u>each</u> species and habitat, including consideration of cumulative effects, and the results of any related studies (50 CFR 402.12 (f)(4)), is required to justify your determination of may effect, not likely adversely effect for each species.

We recommend you continue to refer to the regulations at 50 CFR §402.12 (Biological assessments) and 50 CFR §402.13 (Informal consultation), as amended 84 FR 45016, Aug. 27, 2019, and the ESA Consultation Handbook for guidance on the requirements of section 7 ESA consultation. We can also provide examples of federal agency requests that meet the requirements of informal consultation.

Hope this helps. Sorry for the long email. If you have further questions, I'm available by phone or we can continue the discussion via email.

v/r,
James

James Kwon
Fish and Wildlife Biologist • DoD Coordinator

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Blvd., Rm. 3-122
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Ph: 808-792-9433

INTERIOR REGION 12 • Pacific Islands
American Samoa, Guam, Hawai'i, Northern Mariana Islands

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**From:** Kwon, James <james_kwon@fws.gov>
**Sent:** Tuesday, August 24, 2021 9:02 AM
**To:** YOTT, CHRISTINE J USAF ANG ANGRC/A4 <christine.yott.1@us.af.mil>; PIFWO_Admin, FW1 <pifwo_admin@fws.gov>
**Cc:** STRICKLAND, WILLIAM K USAF ANGRC NGB/A4 <william.strickland.7@us.af.mil>; ASKINS, JASON T MAJ USAF ANG NGB/A4AD <jason.askins@us.af.mil>; FRISCH, MELANIE A USAF ANG NGB/A7 <melanie.frisch@us.af.mil>
**Subject:** Re: [EXTERNAL] Additional info for consultation on ANG's facility at PMRF

Received. I will review the materials and let you know if I have any additional questions. Thank you very much.

James

James Kwon
Fish and Wildlife Biologist • DoD Coordinator

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
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Honolulu, Hawai'i 96850

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INTERIOR REGION 12 • Pacific Islands
American Samoa, Guam, Hawai'i, Northern Mariana Islands

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**From:** YOTT, CHRISTINE J USAF ANG ANGRC/A4 <christine.yott.1@us.af.mil>
**Sent:** Tuesday, August 24, 2021 8:49 AM
**To:** Kwon, James <james_kwon@fws.gov>; PIFWO_Admin, FW1 <pifwo_admin@fws.gov>
**Cc:** STRICKLAND, WILLIAM K USAF ANGRC NGB/A4 <william.strickland.7@us.af.mil>; ASKINS, JASON T MAJ USAF ANG NGB/A4AD <jason.askins@us.af.mil>; FRISCH, MELANIE A USAF ANG NGB/A7 <melanie.frisch@us.af.mil>
**Subject:** [EXTERNAL] Additional info for consultation on ANG's facility at PMRF

**This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.**

Hello Mr. Kwon,

Mahalo for taking the time to meet with my colleagues last week concerning Air National Guard's proposed Space Control Squadron (SPCS) facility at PMRF, Kauai. We have assembled the information you requested. Please see the table below for each item requested and where you can find it in the attachments. Some information is not in the attachments, but contained embedded in the table itself.

Additionally, we have prepared another letter for the SPCS facility to be located on Andersen Air Force Base in Guam (also attached). Please let us know if you require any further information at this point to continue consultation.

| Info Requested | Where to Find Info |
|---|---|
| Purpose and Need | DOPAA – page 1-1 (PDF page 7) |
| Full project description | DOPAA – page 2-1 (PDF page 15) and pages 2-4 & 2-5 (PDF pages 18 & 19) |
| Vicinity map | DOPAA – page A-2 (PDF page 28) |
| Site-specific and action area map | DOPAA – page A-5 (PDF page 31) |
| Number of personnel onsite after construction | DOPAA – page 2-1 (PDF page 15) |
| Lighting | PMRF consultation letter – page 2, paragraph 3 |
| Vegetation levels | PMRF consultation letter – page 2, paragraph 2 (however, note that the site will likely not have any grass and is mostly developed in its current state) |
| Construction timing and manning | Construction will be 12-36 and is projected to commence around Summer 2022, there will be 20-50 construction workers on site. |
| Changes to vegetation | All work would take place within paved areas as described in the EA. It is our understanding that there would be no change in asphalt cover. |
| Total length of barbed wire fencing | Approximately 200x200x200 feet. |
| Vehicle usage | Once construction is complete, the site will have up to 28 vehicles M-F and up to 40 on drill weekends. |
| Personnel education program about species | PMRF currently provides an annual education brief about seabird nesting, all new personnel would be required to participate. |

v/r,

Christine

CHRISTINE J YOTT, M.S., GS-13

NGB/A4AM Plans and Requirements
NEPA Program Manager
Air National Guard Readiness Center
3501 Fetchet Ave, Joint Base Andrews, MD 20762
Comm: 240-612-8422 DSN: 612-8422
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**Hawaiian petrel (*Pterodroma sandwichensis*), Newell's shearwater (*Puffinus auricularis newelli*), and Hawaii Distinct Population Segment of the band-rumped storm petrel (*Oceanodroma castro*):**
Hawaiian seabirds may traverse the project area at night during the breeding, nesting and fledging seasons (March 1 to December 15). Outdoor lighting could result in seabird disorientation, fallout, and injury or mortality. Seabirds are attracted to lights and after circling the lights they may become exhausted and collide with nearby wires, buildings, or other structures or they may land on the ground. Downed seabirds are subject to increased mortality due to collision with automobiles, starvation, and predation by dogs, cats, and other predators. Young birds (fledglings) traversing the project area between September 15 and December 15, in their first flights from their mountain nests to the sea, are particularly vulnerable to light attraction.

To avoid and minimize potential project impacts to seabirds we recommend you incorporate the following applicable measures into your project description:

- Fully shield all outdoor lights so the bulb can only be seen from below bulb height and only use when necessary.
- Install automatic motion sensor switches and controls on all outdoor lights or turn off lights when human activity is not occurring in the lighted area.
- Avoid nighttime construction during the seabird fledging period, September 15 through December 15.

**Hawaiian waterbirds (Hawaiian stilt, *Himantopus mexicanus knudseni*; Hawaiian coot, *Fulica alai*; Hawaiian gallinule, *Gallinula chloropus sandvicensis*; Hawaiian duck, *Anas wyvilliana*):**
Listed Hawaiian waterbirds are found in fresh and brackish-water marshes and natural or man-made ponds. Hawaiian stilts may also be found wherever ephemeral or persistent standing water may occur. Threats to these species include non-native predators, habitat loss, and habitat degradation. Hawaiian ducks are also subject to threats from hybridization with introduced mallards.

The creation of standing or open water may result in the attraction of Hawaiian waterbirds to a site (creative nuisance or habitat sink). In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g. any ponding water), if water is present. Hawaiian waterbirds attracted to sub-optimal habitat may suffer adverse impacts, such as predation and reduced reproductive success, and thus the project may create an attractive nuisance. Therefore, we recommend you work with our office during project planning so that we may assist you in developing measures to avoid impacts to listed species (e.g., fencing, vegetation control, predator management).

To avoid and minimize potential project impacts to Hawaiian waterbirds we recommend you incorporate the following applicable measures into your project description:

- In areas where waterbirds are known to be present, post and enforce reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.
- Incorporate the Service's Best Management Practices for Work in Aquatic Environments into the project design.
- Have a biological monitor that is familiar with the species' biology conduct Hawaiian waterbird nest surveys, where appropriate habitat occurs within the vicinity of the proposed project site, prior to project initiation. Repeat surveys again within 3 days of project initiation and after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest). If a nest or active brood is found:
    - Contact the Service within 48 hours for further guidance.
    - Establish and maintain a 100-foot buffer around all active nests and/or broods until the chicks/ducklings have fledged. Do not conduct potentially disruptive activities or habitat alteration within this buffer.
    - Have a biological monitor that is familiar with the species' biology present on the project site during all construction or earth moving activities until the chicks or ducklings fledge to ensure that Hawaiian waterbirds and nests are not adversely impacted.

**Hawaiian goose (nene), (*Branta (Nesochen) sandvicensis*):** Nene are observed in a variety of habitats, but prefer open areas, such as pastures, golf courses, wetlands, natural grasslands and shrublands, and lava flows. Threats to the species include introduced mammalian and avian predators, wind facilities, and vehicle strikes.

To avoid and minimize potential project impacts to nene we recommend you incorporate the following applicable measures into your project description:

- Do not approach, feed, or disturb nene.
- If nene are observed loafing or foraging within the project area during the breeding season (September through April), have a biologist familiar with the nesting behavior of nene survey for nests in and around the project area prior to the resumption of any work. Repeat surveys after any subsequent delay of work of 3 or more days (during which the birds may attempt to nest).
    - Cease all work immediately and contact the Service for further guidance if a nest is discovered within a radius of 150 feet of proposed work, or a previously undiscovered nest is found within said radius after work begins.
- In areas where nene are known to be present, post and implement reduced speed limits, and inform project personnel and contractors about the presence of endangered species on-site.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2021-I-0430

December 14, 2021

Ms. Christine J. Yott
National Guard Bureau
3501 Fetchet Ave.
Joint Base Andrews, MD 20762

Subject: Construction and Operation of National Guard Bureau Space Control Squadron Bed Down Facilities on Joint Base Pearl Harbor Hickam, Oahu, Hawaii; Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii; and Andersen Air Force Base, Guam

Dear Ms. Yott:

Thank you for your letter, dated November 19, 2021, requesting informal consultation for the construction and operation of the National Guard Bureau (NGB) Space Control Squadron (SPCS) bed down facilities at Joint Base Pearl Harbor Hickam (JBPHH), Oahu, Hawaii; Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, Hawaii; and Andersen Air Force Base (AAFB), Guam; under section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 et seq.). Your letter requested concurrence from the U.S. Fish and Wildlife Service (Service) with your determination that the proposed project may affect, but is not likely to adversely affect the following federally-listed species at the three project locations:

*JBPHH and PMRF-Barking Sands*

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Anas wyvilliana* | Hawaiian duck | Endangered |
| *Branta sandvicensis* (PMRF only) | Hawaiian goose (nene) | Endangered |
| *Fulica americana alai* | Hawaiian coot | Endangered |
| *Gallinula chloropus sandvicensis* | Hawaiian common gallinule | Endangered |
| *Himantopus mexicanus knudseni* | Hawaiian stilt | Endangered |
| *Oceanodrama castro* | Band-rumped storm-petrel Hawaii Distinct Population Segment (DPS) | Endangered |
| *Pterodroma sandwichensis* | Hawaiian petrel | Endangered |
| *Puffinus auricularis newelli* | Newell's shearwater | Threatened |
| *Lasirus cinereus semotus* | Hawaiian hoary bat | Endangered |

INTERIOR REGION 9
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IDAHO, MONTANA*, OREGON*, WASHINGTON
*PARTIAL

INTERIOR REGION 12
PACIFIC ISLANDS
AMERICAN SAMOA, GUAM, HAWAI'I, NORTHERN MARIANA ISLANDS

*Andersen AFB*

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Pteropus mariannus mariannus* | Mariana fruit bat (fanihi) | Threatened |

The findings and recommendations in this consultation are based on the following: 1) your informal consultation request; 2) additional correspondence, and 3) other information available to us and in our files. This response is in accordance with section 7 of the ESA. A complete record of this consultation is on file at our Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii. Our log number for this consultation is 01EPIF00-2021-I-0430.

**DESCRIPTION OF THE PROPOSED ACTION**

The Air Force is proposing to establish two Air National Guard (ANG) SPCSs. The first ANG SPCS, would accommodate the offensive mission and would be located at one of three candidate locations: JBPHH, Hawaii; PMRF-Barking Sands, Hawaii; or AAFB, Guam. The second ANG SPCS, would meet the defensive mission and would be located at one of three candidate locations as identified above. Under the proposed action, facilities would be constructed in support of each SPCS. Each SPCS bed down facility would require the construction of the following facilities (USAF 2020):

- 12,100-square foot (sq ft) building that consists of 3,000 sq ft of administration area, 3,600 sq ft of operational area, 5,200 sq ft of maintenance area, and 300 sq ft of hazardous storage area
- Open floor plan with Secure Compartmentalized Information Facility (SCIF) space capable of accommodating personnel; facility and equipment require Protection Level (PL) 3
- 5,000 square yard (sq yd) equipment pad with an unobstructed view of geosynchronous satellites
- 2,500 sq yd parking lot within 0.25-mile of facilities
- 50-ft security clearance setback throughout perimeter of equipment pad
- Infiltration basin or approved Low Impact Development solution pursuant to Uniform Facilities Criteria (UFC) 3-210-10
- 50-ton air conditioner unit
- 640 ft of fence topped with three strands of barbed wire around a restricted area.

Each SPCS would require the bed down of additional personnel in order to support the SPCS mission, including a sufficient number of ANG space operators and operations support personnel. The first SPCS would require between 88 and 115 new ANG personnel in support of an offensive mission, while the second SPCS would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

Construction is projected to commence in Summer 2022 and is expected to take 12 to 36 months. The first SPCS is expected to achieve Initial Operational Capacity (IOC) by FY22 and Full

Ms. Christine Yott 3

Operational Capacity (FOC) by FY23. The second SPCS is expected to achieve IOC by FY23 and FOC by FY24.

*JBPHH*

New construction would be required to accommodate all aspects of the mission requirements as described above. This site is owned by the U.S. Navy and would require a real property acquisition to allow the Hawaii Air National Guard (HIANG) to develop the proposed mission and bed down facilities.

This site would create hurdles to complete IOC by FY22 and FOC by FY23. A temporary location is required to minimize an impact to IOC. For new construction, a more realistic timeline places IOC into 2025. Currently, there is no temporary location available to house and train personnel.

Additional space on JBPHH must be obtained to establish a temporary secure compartmented information facility (TSCIF) while construction is performed. IOC requirements dictate a facility must in place in order to conduct training operations at the appropriate classification level. Base support services are already available to aid in unit training assembly and full-time workforce services.

*PMRF-Barking Sands*

Renovation of the existing HIANG Building 1115 to accommodate new personnel would be necessary, including the construction of an addition measuring approximately 2,000 sq ft in order to meet the facilities requirement of 12,100 sq ft. Upgrades are needed for electrical distribution system, interior/exterior lighting, fire protection system, roof and exterior envelope, interior finishes, restroom facilities, parking lot, sidewalks, fence and intrusion detection system. Construction of a 300 sq ft hazardous materials (HAZMAT) storage facility with flammable storage locker and the addition of an air conditioning unit are also needed.

This location offers ample space to establish a TSCIF in order to meet IOC requirements while the sustainment, restoration and modernization (SRM) and minor construction work is being completed. Base support services are already available to aid in unit training assembly and full-time workforce services.

*Andersen AFB*

A new Guam Air National Guard (GUANG) facility at AAFB is required to accommodate proposed mission requirements. The proposed site is owned by the U.S. Navy and would require a real property acquisition to allow the GUANG to bed down the proposed mission.

Additional space on AAFB must be obtained to establish a TSICF while construction is performed. IOC requirements dictate a facility must be in place in order to conduct training operations at the appropriate classification level. Base support services are already available to aid in unit training assembly and full-time workforce services. Training of initial cadre of weapon system operators may require travel to another Air Force unit while Guam training capability is being stood up.

**Action Area**
The Action Area includes (1) areas proposed for construction of new facilities or renovation of existing facilities; (2) areas where equipment and materials would be staged; and (3) areas near these locations that might be subject to increased human activity and equipment operation, vehicle traffic, and elevated noise levels.

*JBPHH*

The HIANG has identified Hickam Softball Field on JBPHH as a suitable location for the proposed mission. It is bounded by Worchester Ave./Mamala Bay Dr. and in proximity of a runway operated by the Daniel K. Inouye International Airport.

*PMRF-Barking Sands*

Construction activities associated with the proposed action would occur entirely within the existing boundaries of the HIANG PMRF-Barking Sands facility on areas of existing land use that include land currently developed and classified as industrial. Land use surrounding the site is open space, and the Kawaiele Waterbird Sanctuary is located approximately 400 feet directly north of the site, outside of the boundaries of the installation. The majority of the proposed SPCS site is currently paved, with small areas of landscaped grasses, trees, and shrubs that are highly disturbed by regular mowing and maintenance.

*Andersen AFB*

The GUANG would require a large enough site on AAFB to adequately bed down a SPCS function in accordance with force structure changes identified by the FY19 Program Action Memorandum. The 36 WG Commander offered the GUANG a site that is approximately five acres in size to accommodate the proposed mission requirements. The site is on AAFB proper near the Base Exchange, which is bounded by New York Avenue, 4th Street, Mobile Avenue, and 5th Street. The area has sufficient open space to allow for up to 10 acres in the event that additional space is required.

Avoidance and Minimization Measures

To avoid and minimize impacts to listed species, the following measures will be implemented at JBPHH and PMRF-Barking Sands:

For all species:

- ANG personnel and contractors will receive training on the presence of ESA-listed species including on-site training to ensure understanding of natural resource policies and wildlife protection regulations and protocols;
- ANG personnel and contractors will adhere to posted speed limits and educate personnel on the potential for collisions with listed species during construction and operations;

- No construction activities will be conducted overnight, and site lighting will be kept to a minimum.

For the Hawaiian hoary bat:

- Woody plants and tree greater than 15 feet tall will not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15).
- The use of barbed or razor wire fencing will be minimized as allowable by facility security requirements.

For the Hawaiian goose or nene (at PMRF only):

- ANG personnel or contractors will not approach, feed, or otherwise disturb nene;
- ANG personnel and contractors will receive training on "Nene Guidelines for PMRF Operations" and "Good Samaritan Hazing" training for nene;
- ANG personnel and contractors will contact PMRF Natural Resources staff should any endangered birds be seen on the parcel;
  - If nene are observed loafing or foraging within the project area during the breeding season (September through April), a biologist familiar with the nesting behavior of nene will survey for nests in and around the construction area prior to the resumption of any construction work. Repeat surveys after any subsequent delay of work of three or more days (during which the birds may attempt to nest).
- A mowing plan will be developed and implemented to ensure vegetation does not grow to a height that is attractive to the nene for nesting;
- If a Hawaiian goose nest is discovered within a radius of 46 m (150 ft) of proposed work, or a previously undiscovered nest is found within that radius after work begins, all outside construction work within that vicinity will cease immediately and the NGB will contact the PMRF Installation Environmental Program Director, the PMRF Natural Resource Manager, and USFWS for further guidance.

For the Hawaiian waterbirds (*Anas wyvilliana* or Hawaiian duck, *Fulica americana alai* or Hawaiian coot, *Gallinula chloropus sandvicensis* or Hawaiian common gallinule, and *Himantopus mexicanus knudseni* or Hawaiian stilt)

- During construction, eliminate areas of standing water that may attract waterbirds;
- If a Hawaiian waterbird nest is discovered within a radius of 46 m (150 ft) of proposed work, or a previously undiscovered nest is found within that radius after work begins, all outside construction work within that vicinity will cease immediately and the will contact the Installation Environmental Program Director and Natural Resource Manager at PMRF, the Natural Resources Manager at JBPHH, and the Service for further guidance.

For the Hawaiian seabirds (band-rumped storm-petrel Hawaii DPS, Hawaiian Petrel, or Newell's shearwater)

- Any construction occurring during the nocturnal seabird fledgling period (mid-September through mid-December) would occur only during daylight hours;

- ANG will coordinate with PMRF's Natural Resources staff to ensure an annual seabird brief is given to all SPCS contractors and personnel including "PMRF 2019 Dark Skies Program Briefing & Natural Resources Training", "Environmental Orientation for MDA Personnel", and "Shearwater Fallout Instructions" (materials available upon request);
- The ANG will comply with the annual mid-September to mid- December Dark Skies program by
  - only using lighting at night if required for Force Protection or safety; and
  - using shades to prevent indoor lighting at windows from being visible to birds outside;
- The ANG will utilize a lighting design plan that focuses outside lighting downward (fully shielded so that the bulb can only be seen from below bulb height); installs motion sensors on outdoor lights that turn off when human activity is not occurring in the lighted area; and uses the appropriate colored bulbs for all outside structures, towers, and electrical distribution lines;
- Between mid-September and mid-December, dusk to dawn perimeter lighting would be turned off at all times and flood area lighting would be turned off. Security infrared lighting would be used at all times in and around the facility's restricted area. Security lighting at the proposed SPCS facility would be a combination of infrared and regular lighting and all newly-installed fixtures would be full cutoff, with bulbs shielded above and around all sides. Hawaii ANG is also considering lighting with a yellowish tint that would be less likely attract insects and their predators (i.e., birds and bats).

To avoid and minimize impacts to the Mariana fruit bat, the following measures will be implemented at AAFB:

- Construction will only occur during daylight hours.

**CONSEQUENCES OF THE PROPOSED ACTION**

*JBPHH and PMRF*

Hawaiian waterbirds

Hawaiian waterbirds are found in a variety of wetland habitats including freshwater marshes and ponds, coastal inlets, artificial reservoirs, taro (*Colocasia esculenta*) patches, irrigation ditches, sewage treatment ponds. At PMRF, the listed Hawaiian waterbirds are known to occupy the oxidation ponds and Kawaiele Waterbird Sanctuary, adjacent to segments of the action area. In addition, Hawaiian stilts may also be found wherever temporary or persistent standing water occurs. At JBPHH, the Hawaiian stilt has been observed in several areas near the proposed project site at Ahua Reef wetland, Fort Kamehameha wetland, Kumumau Canal and Manuwai Canal, with nesting documented only at the Ahua Reef wetland (JBPHH 2021).

Noise and activity from the project could result in disturbance of endangered waterbirds within and adjacent to the project area. Endangered waterbirds may also be accidentally injured or killed as a result of heavy equipment operation and human activity during the project. Based on the project details provided, your project may result in the creation of standing water or open water that could attract Hawaiian waterbirds to the project site. In particular, the Hawaiian stilt is known to nest in sub-optimal locations (e.g. any ponding water), if water is present.

Implementation of conservation measures to eliminate standing water that may attract waterbirds and to stop work within 150 feet of waterbirds will reduce potential impacts to a level that is insignificant and discountable. Due to the ability of endangered waterbirds to easily exit the area of disturbance and the implementation of avoidance, minimization, and conservation measures, we consider the adverse effects to endangered waterbirds possible, but unlikely to occur, so the effects would be considered discountable.

<u>Hawaiian goose (PMRF only)</u>
Hawaiian geese breed, loaf, and flock on PMRF property. They are found in virtually all habitat types with a particular affinity to open grassy areas, including landscaped and mowed areas. Due to Hawaiian geese congregating in these type of habitats, they are regularly within the vicinity of roadways, leaving them vulnerable to vehicular strikes.

Noise and activity from the project could result in disturbance of Hawaiian geese within and adjacent to the project area. Hawaiian geese may also be accidentally injured or killed as a result of heavy equipment operation and human activity (e.g. vehicle operation) during the project operations. Due to the ability of Hawaiian geese to easily exit the area of disturbance and the implementation of avoidance, minimization, and conservation measures designed to prevent interactions with nene, we consider the adverse effects to Hawaiian geese possible, but unlikely to occur, so the effects would be considered discountable.

<u>Hawaiian hoary bat</u>
The Hawaiian hoary bat roots in the foliage of trees and is most often observed foraging in open areas, near the edges of forest or over open water. On PMRF, Hawaiian hoary bats have been detected year-round with a peak in activity between September through December (Bonaccorso & Pinzari 2011).

If trees or shrubs 15 feet or taller are cleared during the pupping season, June 1 through September 15, there is a risk that young bats could inadvertently be harmed or killed, since they are too young to fly or move away from disturbance. At PMRF, there is a single tree and no other vegetation 15 feet or taller within the proposed construction area. However, because the project will not cut, clear, trim, or otherwise disturb trees greater than 15 ft during Hawaiian hoary bat pupping season (June 1 through September 15) at JBPHH or PMRF, impacts to pups are unlikely.

Bat mortality caused by individuals becoming snagged on barbed wire has been documented. Annual mortality estimates range from 0 to 0.8 bats per 100 kilometers (0 to 1.3 per 100 miles) of barbed wire (Zimpfer and Bonaccorso 2010). At PMRF and JBPHH, a security fence encompassing total of 1,280 linear feet of fence with three strands of barbed wire or a total of 3,840 linear feet of barbed wire is proposed. Using the higher end (0.013 bats/mile) of the above formula as a conservative estimate, a total of 0.7272 miles x 0.013 bats/year x 30 years = 0.2836 bat mortalities over the project lifespan is estimated. Therefore, the effects to the Hawaiian hoary bat from this project are either insignificant or discountable.

Hawaiian seabirds
These species may fly through the action area at night during the breeding, nesting, and fledging seasons (March 1 to December 15). They are attracted to lights and after circling the lights they may become exhausted or disoriented, causing them to fall to the ground. Downed seabirds are subject to injury or death due to collision with automobiles, starvation, and predation. At PMRF, young birds flying through the action area between September 15 and December 15, in their first flights from their nests to the ocean, are particularly vulnerable to light attraction. However, at JBPHH, the likelihood of young birds flying through the project site is extremely low due to the substantial development and outdoor lighting associated with JBPHH, the Daniel K. Inouye International Airport, and developed portions of Honolulu.

Implementation of the seabird avoidance and minimization measures will reduce the potential impacts to listed seabirds as a result of light attraction to a level that is insignificant or unlikely. Noise generated by the operation of construction equipment will be intermittent and negligible to seabirds. Thus, impacts on listed seabirds are considered discountable.

*Andersen AFB*

Mariana fruit bat
The Mariana fruit bat is a nocturnal, colonial species that utilizes primary limestone forest and secondary forest for foraging and roosting. The Mariana fruit bat is known to occur throughout AAFB and may be disturbed during nighttime foraging or daytime roosting by the elevated noise and artificial light associated with construction and operation activities. Because no nighttime construction or vegetation removal is proposed, and no known roosts or foraging habitat occurs within 492 ft (150 m) of the action area, impacts to Mariana fruit bats transiting the site are expected to be negligible. Thus, impacts on the Mariana fruit bat are considered discountable.

**Summary**
Based upon the analysis above, we concur with NGB's determination that the proposed project may affect, but is not likely to adversely affect the threatened or endangered species at AAFB, JBPHH, and PMRF-Barking Sands addressed in this letter. Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or, (3) if a new species is listed or critical habitat designated that may be affected by the identified action.

Ms. Christine Yott 9

We appreciate your efforts to conserve threatened and endangered species and their habitats. If you have any questions, please contact Fish and Wildlife Biologist, James Kwon at james_kwon@fws.gov, or by telephone at 808-792-9433.

Sincerely,

DARREN LEBLANC Digitally signed by DARREN LEBLANC Date: 2021.12.16 08:56:59 -10'00'

Darren LeBlanc
Planning and Consultation Team Manager

Cc: Jessi Behnke, PMRF
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**List of References**

Bonaccorso, F.J. and C.A. Pinzari. 2011. Hawaiian hoary bat occupancy at the Pacific Missile Range Facility (PMRF) and Satellite Facilities. Final Report. September 2011. 26 pp.

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# APPENDIX B
# AIR QUALITY

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# Air Quality Impact Analysis

## *B.1 Air Quality*

This appendix presents an overview of the Clean Air Act (CAA) and the relevant State of Hawaii, Department of Health (DOH) Clean Air Branch (CAB) and Guam Environmental Protection Agency (Guam EPA) requirements. It also presents calculations, including the assumptions used for the air quality analyses presented in the Air Quality sections of this Environmental Assessment.

### *B.1.1 Air Quality Program Overview*

To protect public health and welfare, the United States Environmental Protection Agency (USEPA) has developed numerical concentration-based standards, or National Ambient Air Quality Standards (NAAQS), for six "criteria" pollutants (based on health-related criteria) under the provisions of the CAA Amendments of 1970. There are two kinds of NAAQS: Primary and Secondary standards. Primary standards prescribe the maximum permissible concentration in the ambient air to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards prescribe the maximum concentration or level of air quality required to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings (40 Code of Federal Regulations [CFR] § 50).

The CAA gives states the authority to establish air quality rules and regulations. These rules and regulations must be equivalent to, or more stringent than, the federal program. In Guam, the Guam EPA oversees the territory's air pollution control program under the authority of the federal CAA and amendments, federal regulations, and state laws. In Hawaii, the State of Hawaii DOH CAB oversees the state's air pollution control program under the authority of the federal CAA and amendments, federal regulations, and state laws. Guam EPA and DOH CAB have adopted the federal NAAQS; additionally, Guam EPA and DOH CAB have adopted standards for several air pollutants that are more stringent than the NAAQS, as shown in **Table B-1**.

Based on measured ambient air pollutant concentrations, the USEPA designates areas of the United States as having air quality better than (attainment) the NAAQS, worse than (nonattainment) the NAAQS, and unclassifiable. The areas that cannot be classified (on the basis of available information) as meeting or not meeting the NAAQS for a particular pollutant are "unclassifiable" and are treated as attainment until proven otherwise. Attainment areas can be further classified as "maintenance" areas, which are areas previously classified as nonattainment, but where air pollutant concentrations have been successfully reduced to below the standard. Maintenance areas are under special maintenance plans, and must operate under some of the nonattainment area plans to ensure compliance with the NAAQS.

Section 176(c) (1) of the CAA contains legislation that ensures federal activities conform to relevant state implementation plans (SIPs) and thus do not hamper local efforts to control air pollution. Conformity to a SIP is defined as conformity to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS, and achieving expeditious attainment of such standards. As such, a general conformity analysis is required for areas of nonattainment or maintenance where a federal action is proposed. In such areas, a conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of that pollutant equal or exceed its *de minimis* rates as shown in **Table B-2** (40 CFR § 93.153). For the Proposed Action, Alternatives A, B and C are all located in attainment areas of all NAAQS and therefore General Conformity does not apply to any of the alternatives.

Direct emissions are those that occur as a direct result of the action. For example, construction emissions from vehicles and equipment used to clear and grade building sites, build new buildings or renovate existing buildings, and construct parking lots or equipment pads must be evaluated. Indirect emissions are those that occur at a later time or at a distance from a proposed action. For example, increased vehicular/commuter traffic as a result of additional personnel is considered an indirect emission.

**Table B-1**
**National Ambient Air Quality Standards and**
**Ambient Air Quality Standards in State of Hawaii and Guam**

| Pollutant | Averaging Period | NAAQS | | AAQS | |
|---|---|---|---|---|---|
| | | Primary Standard | Secondary Standard | State of Hawaii | Guam |
| Carbon monoxide (CO) | 8-hour[a] | 9 ppm | - | 4.4 ppm | NAAQS |
| | 1-hour[a] | 35 ppm | - | 9 ppm | NAAQS |
| Nitrogen dioxide ($NO_2$) | Annual[c] | 0.053 ppm | 0.053 ppm | 0.04 ppm | 0.05 ppm |
| | 1-hour[d] | 0.100 ppm | - | NAAQS | NAAQS |
| Ozone ($O_3$) | 8-hour[e] | 0.070 ppm | 0.070 ppm | 0.075 ppm | NAAQS |
| | 1-hour[f] | - | - | - | 0.12 ppm |
| Lead (Pb) | 3-month[g] | 0.15 $\mu g/m^3$ | 0.15 $\mu g/m^3$ | NAAQS | NAAQS |
| Particulate ≤10 µm ($PM_{10}$) | Annual[h] | - | - | 50 $\mu g/m^3$ | - |
| | 24-hour[i] | 150 $\mu g/m^3$ | 150 $\mu g/m^3$ | NAAQS | NAAQS |
| Particulate ≤2.5 µm ($PM_{2.5}$) | Annual[j] | 12 $\mu g/m^3$ | 15 $\mu g/m^3$ | NAAQS | NAAQS |
| | 8-hour | - | - | - | 24.3 $\mu g/m^3$ |
| | 24-hour[k] | 35 $\mu g/m^3$ | 35 $\mu g/m^3$ | NAAQS | NAAQS |
| Sulfur dioxide ($SO_2$) | 1-hour[l] | 0.075 ppm | - | NAAQS | NAAQS |
| | 3-hour[a] | - | 0.5 ppm | NAAQS | NAAQS |
| | 4-hour[m] | - | - | - | 0.25 ppm |
| | 24-hour[n] | - | - | 0.14 ppm | 0.12 ppm |
| | Annual | - | - | 0.03 ppm | 0.02 ppm |
| Hydrogen sulfide ($H_2S$) | 1-hour | - | - | 0.025 ppm | - |

Sources: USEPA 2021a; DOH CAB, 2021; 22 Guam Administrative Rule, Division II, Chapter 1

Notes:

a. Second highest non-overlapping 8-hour average not to be exceeded more than once in a year.
b. Maximum 1-hour concentration not to be exceeded more than once in a year.
c. Annual arithmetic mean.
d. In February 2010, the USEPA established a new 1-hour standard for $NO_2$ at a level of 0.100 ppm, based on the 3-year average of the 98th percentile of the yearly distribution concentration, to supplement the then-existing annual standard.
e. In October 2015, the USEPA revised the level of the 8-hour standard to 0.070 ppm, based on the annual 4th highest daily maximum concentration, averaged over 3 years; the regulation became effective on 28 December 2015. The previous (2008) standard of 0.075 ppm remains in effect for some areas.
f. In November 2008, USEPA revised the primary lead standard to 0.15 $\mu g/m^3$. USEPA revised the averaging time to a rolling 3-month average; the State of Hawaii 3-month averaging time is based on calendar quarter.
g. Due to a lack a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the USEPA revoked the annual $PM_{10}$ standard effective 2006 December 17; however, the State of Hawaii has retained an annual $PM_{10}$ standard.
h. In October 2006, USEPA revised the level of the 24-hour $PM_{2.5}$ standard to 35 $\mu g/m^3$ and retained the level of the annual $PM_{2.5}$ standard at 15 $\mu g/m^3$. In 2012, USEPA split standards for primary & secondary annual $PM_{2.5}$. All are averaged over 3 years, with the 24-hour average determined at the 98th percentile for the 24-hour standard. USEPA retained the 24-hour primary standard and revoked the annual primary standard for $PM_{10}$.
i. Territory of Guam maximum 8-hr concentration not to be exceeded more than once in a year.
j. In 2012, the USEPA retained a secondary 3-hour standard, which is not to be exceeded more than once per year. In June 2010, the USEPA established a new 1-hour $SO_2$ standard at a level of 75 ppb, based om the 3-year average of the annual 99th percentile.
k. Maximum 4-hour concentration not to be exceeded more than once in a year.
l. Maximum 24-hr concentration not to be exceeded more than once in a year.

CO = carbon monoxide; $NO_x$ = nitrogen oxide; $O_3$ = ozone; Pb = lead; $PM_{2.5}$ = particulate matter with a diameter of less than 2.5 micrometers; $PM_{10}$ = particulate matter with a diameter of less than 10 micrometers; $SO_2$ = sulfur dioxide; µm = micrometer(s); $\mu g/m^3$ = microgram(s) per cubic meter; ppm = part(s) per million; USEPA = United States Environmental Protection Agency

**Table B-2**
**General Conformity Rule *De Minimis* Emission Thresholds**

| Pollutant | Attainment Classification | Tons per year |
|---|---|---|
| Ozone (VOC and $NO_x$) | Serious nonattainment | 50 |
| | Severe nonattainment | 25 |
| | Extreme nonattainment | 10 |
| | Other areas outside an ozone transport region (applicable to all three alternatives) | 100 |
| Ozone ($NO_x$) | Marginal and moderate nonattainment inside an ozone transport region | 100 |
| | Maintenance | 100 |
| Ozone (VOC) | Marginal and moderate nonattainment inside an ozone transport region | 50 |
| | Maintenance within an ozone transport region | 50 |
| | Maintenance outside an ozone transport region | 100 |
| CO, $SO_2$ and $NO_2$ | All nonattainment and maintenance | 100 |
| $PM_{10}$ | Serious nonattainment | 70 |
| | Moderate nonattainment and maintenance | 100 |
| $PM_{10}$ | Serious nonattainment | 70 |
| | Moderate nonattainment and maintenance | 100 |
| $PM_{2.5}$ (Direct emissions, $SO_2$, $NO_x$, VOC, and ammonia) | Serious nonattainment | 70 |
| | All nonattainment and maintenance | 100 |
| Lead | All nonattainment and maintenance | 25 |

Source: USEPA, 2021b
CO = carbon monoxide; $NO_2$ = nitrogen dioxide; $NO_x$ = nitrogen oxides; $PM_{2.5}$ = particulates equal to or less than 2.5 microns in diameter; $PM_{10}$ = particulates equal to or less than 10 microns in diameter; $SO_2$ = sulfur dioxide; VOC = volatile organic compounds

Each state is required to develop a SIP that sets forth how CAA provisions will be imposed within the state. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS within each state and includes control measures, emissions limitations, and other provisions required to attain and maintain the ambient air quality standards. The purpose of the SIP is twofold. First, it must provide a control strategy that will result in the attainment and maintenance of the NAAQS. Second, it must demonstrate that progress is being made in attaining the standards in each nonattainment area.

The DOH CAB and Guam EPA operate and maintain ambient air monitoring networks that use the methods and procedures approved by the USEPA. The purpose is to monitor, assess, and provide information on ambient air quality conditions and trends as specified by the federal CAA and state or territory. The air quality monitoring network is used to identify areas where the ambient air quality standards are being violated, and where plans are needed to reduce pollutant concentration levels to be in attainment with the standards. Also included are areas where the ambient standards are being met, but plans are necessary to ensure maintenance of acceptable levels of air quality in the face of anticipated population or industrial growth.

The result of this attainment/maintenance analysis is the development of strategies for controlling emissions of criteria air pollutants from stationary and mobile sources. The first step in this process is the annual compilation of the ambient air monitoring results, and the second step is the analysis of the monitoring data for general air quality, exceedances of air quality standards, and pollutant trends.

Under the CAA new stationary emissions sources are subject to New Source Review (NSR) in order to obtain a construction permit. Permits are required for new major sources or sources making major modifications. In areas that meet the National Ambient Air Quality Standards the permits are referred to as Prevention of Significant Deterioration (PSD) permits and the process to obtain permit approval is called PSD review. In nonattainment areas the permitting process is referred to as nonattainment NSR. The purpose of PSD review is to ensure that sources are constructed without causing significant adverse deterioration to clean air in the area. Nonattainment NSR purpose is to ensure new sources do not impede a region’s progress to achieve compliance with NAAQS through the use of emission control technology and by offsetting the emission increases.

### *B.1.2 Project Calculations and Assumptions*

This section includes a discussion of calculations used for the air quality analyses presented in the Air Quality sections of this Environmental Assessment. A Record of Air Analysis precedes the detailed Air Conformity Applicability Model (ACAM) Report for the proposed alternatives. Each detailed ACAM report includes a general description of the project, the calculations used to estimate emissions, and timeline assumptions made for each phase of the project, as well as ongoing emissions once the project is completed.

Key ACAM input data assumptions and notes are provided, as follows:

- The start date for all activities for each alternative is assumed to be January 1, 2022. The duration of the construction project is assumed to be 12 months from the assumed start date. January is assumed as the start month so that emissions are estimated for the full 12-month period in the same year.
- Construction phase emissions for the alternatives are included for demolition, grading, excavation, construction/renovation, architectural coating, and paving. Personnel emissions are for the additional personnel required to support SPCS #4 and SPCS #5 missions.
- In general, duration of construction phase activities entered into ACAM was based on the duration of the entire proposed project provided by the facility and the size of project area in square foot.
- ACAM inputs for all phase lengths were conservatively estimated as twice the phasing length values contained in California Emissions Estimator Model (CALEEMod), Appendix D, Default Data Tables, Table 3.1 Phase Length (CALEED, 2017). The default data table provides the number of days (or months) for demolition, construction, grading, excavating, paving and architectural coating activities based on the size (in acres) of the project site.
- Demolition of existing asphalt/concrete parking lots was estimated based on an assumed height (e.g., 0.5 ft) for demolition. ACAM typically estimates emissions only from demolition of buildings, so a minimum height is assumed.
- For grading, depth for grading area is assumed to be 0.5 feet. Volumes of materials hauled in and hauled out (in cubic yards) were estimated using the assumed depth and graded area.
- Emissions for building renovations were estimated in ACAM as a construction project with the following modification to default equipment: crane operation removed; one aerial lift added (3 hrs/day) added; one "other material handling equipment" (6 hrs/day) added. ACAM defaults were used in lieu of base-specific data.

### *B.1.3 Regulatory Comparisons*

The Council on Environmental Quality defines significance in terms of context and intensity in 40 CFR § 1508.27. This requires that the significance of the action be analyzed with respect to the setting of the proposed alternatives and based relative to the severity of the impact. The Council on Environmental Quality National Environmental Policy Act regulations (40 CFR § 1508.27[b]) provide 10 key factors to consider in determining an impact’s intensity.

For this air quality analysis, the annual net increase in emissions for each project alternative was compared to the PSD permitting threshold of 250 tpy for criteria pollutants (except for lead which is 25 tpy). The PSD permitting threshold was used as an indicator of the significance of potential impacts to air quality. If the increases in emissions from proposed action alternatives are below the applicable PSD permitting thresholds for each criteria pollutant, it would indicate that the air quality impacts for each of the pollutants are not likely to be significant. **Appendix B-3** provides the Detailed Air Conformity Applicability Model Report to demonstrate the ACAM inputs and the calculation methodologies used to estimate emissions.

### *B.1.4 References*

CALEED. *California Air Emissions Estimator Model.* http://www.aqmd.gov/docs/default-source/caleemod/05_appendix-d2016-3-2.pdf?sfvrsn=4 Accessed March 5, 2021

USEPA. 2010. *40 CFR Parts 51 and 93, Revisions to the General Conformity Regulations*. 75 FR 14283, EPA-HQ-OAR-2006-0669; FRL-9131-7. 24 March.

USEPA. 2021a. NAAQS Table. https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed March 08, 2021.

USEPA. 2021b. *General Conformity: De minimis Tables*. https://www.epa.gov/general-conformity/de-minimis-tables. Accessed March 08, 2021.

# Appendix B-2

## Summary Air Conformity Applicability Model Reports

## Record of Air Analysis (ROAA) Space Control Squadron Beddown for SPCS #4 and SPCS #5 Basing Actions EA

(For General Conformity Applicability Determination and National Environmental Policy Act Air Quality Assessment)

# Alternative A: SPCS #4 PMRF-Barking Sands

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**b. Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**c. Project Number/s (if applicable):** Not Applicable

**d. Projected Action Start Date:** 1 / 2022

**e. Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kauaʻi, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, Oʻahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**f. Point of Contact:**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**2. Air Impact Analysis:** Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

**Analysis Summary: Alternative A – SPCS #4 PMRF Barking Sands**

**2022**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.534 | 250 | No |
| **NOx** | 1.752 | 250 | No |
| **CO** | 4.532 | 250 | No |
| **SOx** | 0.006 | 250 | No |
| **PM 10** | 0.744 | 250 | No |
| **PM 2.5** | 0.065 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.014 | 250 | No |
| **CO2e** | 697.9 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.203 | 250 | No |
| **NOx** | 0.167 | 250 | No |
| **CO** | 2.410 | 250 | No |
| **SOx** | 0.001 | 250 | No |
| **PM 10** | 0.003 | 250 | No |
| **PM 2.5** | 0.003 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.013 | 250 | No |
| **CO2e** | 206.4 | | |

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

Drea Traeumer, Environmental Scientist

03/08/2021
DATE

# Alternative A: SPCS #5 PMRF-Barking Sands

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**b. Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**c. Project Number/s (if applicable):** Not Applicable

**d. Projected Action Start Date:** 1 / 2022

**e. Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kauaʻi, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, Oʻahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**f. Point of Contact:**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**2. Air Impact Analysis:** Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

**Analysis Summary: Alternative A – SPCS #5 PMRF Barking Sands**

**2022**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.516 | 250 | No |
| **NOx** | 1.737 | 250 | No |
| **CO** | 4.322 | 250 | No |
| **SOx** | 0.006 | 250 | No |
| **PM 10** | 0.744 | 250 | No |
| **PM 2.5** | 0.065 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.013 | 250 | No |
| **CO2e** | 679.9 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.185 | 250 | No |
| **NOx** | 0.153 | 250 | No |
| **CO** | 2.200 | 250 | No |
| **SOx** | 0.001 | 250 | No |
| **PM 10** | 0.003 | 250 | No |
| **PM 2.5** | 0.003 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.012 | 250 | No |
| **CO2e** | 188.4 | | |

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

Drea Traeumer, Environmental Scientist

03/09/2021
DATE

# Alternative B: SPCS #4 JBPH-Hickam

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**b. Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**c. Project Number/s (if applicable):** Not Applicable

**d. Projected Action Start Date:** 1 / 2022

**e. Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua'i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O'ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**f. Point of Contact:**

| | |
|---|---|
| **Name:** | Drea Traeumer |
| **Title:** | Environmental Scientist |
| **Organization:** | Environmental Assessment Services |
| **Email:** | drea.traeumer@easbio.com |
| **Phone Number:** | 775.750.0472 |

**2. Air Impact Analysis:** Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

**Analysis Summary: Alternative B - SPCS #4 JBPH-Hickam**

**2022**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.532 | 250 | No |
| **NOx** | 1.160 | 250 | No |
| **CO** | 3.712 | 250 | No |
| **SOx** | 0.005 | 250 | No |
| **PM 10** | 0.814 | 250 | No |
| **PM 2.5** | 0.042 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.014 | 250 | No |
| **CO2e** | 516.1 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.203 | 250 | No |
| **NOx** | 0.167 | 250 | No |
| **CO** | 2.410 | 250 | No |
| **SOx** | 0.001 | 250 | No |
| **PM 10** | 0.003 | 250 | No |
| **PM 2.5** | 0.003 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.013 | 250 | No |
| **CO2e** | 206.4 | | |

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

Drea Traeumer, Environmental Scientist

03/08/2021
DATE

# Alternative B: SPCS #5 JBPH-Hickam

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**b. Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**c. Project Number/s (if applicable):** Not Applicable

**d. Projected Action Start Date:** 1 / 2022

**e. Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua'i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O'ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**f. Point of Contact:**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**2. Air Impact Analysis:** Based on the attainment status at the action location, the requirements of the General Conformity Rule are:

_____ applicable
__X__ not applicable

Total net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (i.e., net gain/loss upon action fully implemented) emissions. The ACAM analysis used the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the USAF Air Emissions Guide for Air Force Stationary Sources, the USAF Air Emissions Guide for Air Force Mobile Sources, and the USAF Air Emissions Guide for Air Force Transitory Sources.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of potential impacts to air quality based on current ambient air quality relative to the National Ambient Air Quality Standards (NAAQSs). These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold for actions occurring in areas that are "Clearly Attainment" (i.e., not within 5% of any NAAQS) and the GCR de minimis values (25 ton/yr for lead and 100 ton/yr for all other criteria pollutants) for actions occurring in areas that are "Near Nonattainment" (i.e., within 5% of any NAAQS). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria pollutant is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQSs. For further detail on insignificance indicators see chapter 4 of the Air Force Air Quality Environmental Impact Analysis Process (EIAP) Guide, Volume II - Advanced Assessments.

The action's net emissions for every year through achieving steady state were compared against the Insignificance Indicator and are summarized below.

**Analysis Summary: Alternative B - SPCS #5 JBPH-Hickam**

**2022**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.514 | 250 | No |
| **NOx** | 1.146 | 250 | No |
| **CO** | 3.502 | 250 | No |
| **SOx** | 0.004 | 250 | No |
| **PM 10** | 0.813 | 250 | No |
| **PM 2.5** | 0.042 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.013 | 250 | No |
| **CO2e** | 498.2 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | INSIGNIFICANCE INDICATOR | |
|---|---|---|---|
| | | Indicator (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.185 | 250 | No |
| **NOx** | 0.153 | 250 | No |
| **CO** | 2.200 | 250 | No |
| **SOx** | 0.001 | 250 | No |
| **PM 10** | 0.003 | 250 | No |
| **PM 2.5** | 0.003 | 250 | No |
| **Pb** | 0.000 | 25 | No |
| **NH3** | 0.012 | 250 | No |
| **CO2e** | 188.4 | | |

None of estimated annual net emissions associated with this action are above the insignificance indicators, indicating no significant impact to air quality. Therefore, the action will not cause or contribute to an exceedance on one or more NAAQSs. No further air assessment is needed.

Drea Traeumer, Environmental Scientist

03/08/2021
DATE

# Alternative C: SPCS #4 Andersen AFB

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**
**Base:** ANDERSEN AFB
**State:** Guam
**County(s):** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Tanguisson, GU; Piti-Cabras, GU

**b. Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**c. Project Number/s (if applicable):** Not Applicable

**d. Projected Action Start Date:** 1 / 2022

**e. Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua'i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O'ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**f. Point of Contact:**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**2. Analysis:** Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable

__X__ not applicable

**Conformity Analysis Summary: Alternative C - SPCS #4 Andersen AFB**
**2022**

| Pollutant | Action Emissions (ton/yr) | GENERAL CONFORMITY | |
|---|---|---|---|
| | | Threshold (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.677 | | |
| **NOx** | 1.238 | | |
| **CO** | 7.077 | | |
| **SOx** | 0.008 | | |
| **PM 10** | 0.824 | | |
| **PM 2.5** | 0.045 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.054 | | |
| **CO2e** | 565.4 | | |
| Piti, GU | | | |
| **VOC** | 0.677 | | |
| **NOx** | 1.238 | | |
| **CO** | 7.077 | | |
| **SOx** | 0.008 | 100 | No |
| **PM 10** | 0.824 | | |
| **PM 2.5** | 0.045 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.054 | | |
| **CO2e** | 565.4 | | |
| Tanguisson, GU | | | |
| **VOC** | 0.677 | | |
| **NOx** | 1.238 | | |
| **CO** | 7.077 | | |
| **SOx** | 0.008 | 100 | No |
| **PM 10** | 0.824 | | |
| **PM 2.5** | 0.045 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.054 | | |
| **CO2e** | 565.4 | | |
| Piti-Cabras, GU | | | |
| **VOC** | 0.677 | | |
| **NOx** | 1.238 | | |
| **CO** | 7.077 | | |
| **SOx** | 0.008 | 100 | No |
| **PM 10** | 0.824 | | |
| **PM 2.5** | 0.045 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.054 | | |
| **CO2e** | 565.4 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | GENERAL CONFORMITY | |
|---|---|---|---|
| | | Threshold (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.334 | | |
| **NOx** | 0.274 | | |
| **CO** | 5.471 | | |
| **SOx** | 0.005 | | |
| **PM 10** | 0.015 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 264.1 | | |
| Piti, GU | | | |
| **VOC** | 0.334 | | |
| **NOx** | 0.274 | | |
| **CO** | 5.471 | | |
| **SOx** | 0.005 | 100 | No |
| **PM 10** | 0.015 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 264.1 | | |
| Tanguisson, GU | | | |
| **VOC** | 0.334 | | |
| **NOx** | 0.274 | | |
| **CO** | 5.471 | | |
| **SOx** | 0.005 | 100 | No |
| **PM 10** | 0.015 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 264.1 | | |
| Piti-Cabras, GU | | | |
| **VOC** | 0.334 | | |
| **NOx** | 0.274 | | |
| **CO** | 5.471 | | |
| **SOx** | 0.005 | 100 | No |
| **PM 10** | 0.015 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 264.1 | | |

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

Drea Traeumer, Environmental Scientist

03/08/2021
DATE

# Alternative C: SPCS #5 Andersen AFB

**1. General Information:** The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

**a. Action Location:**
**Base:** ANDERSEN AFB
**State:** Guam
**County(s):** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Tanguisson, GU; Piti-Cabras, GU

**b. Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**c. Project Number/s (if applicable):** Not Applicable

**d. Projected Action Start Date:** 1 / 2022

**e. Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua‘i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O‘ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**f. Point of Contact:**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**2. Analysis:** Total combined direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

**Conformity Analysis Summary: Alternative C - SPCS #5 Andersen AFB**
**2022**

| Pollutant | Action Emissions (ton/yr) | GENERAL CONFORMITY | |
|---|---|---|---|
| | | Threshold (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.647 | | |
| **NOx** | 1.214 | | |
| **CO** | 6.601 | | |
| **SOx** | 0.008 | | |
| **PM 10** | 0.823 | | |
| **PM 2.5** | 0.044 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 542.5 | | |
| Piti, GU | | | |
| **VOC** | 0.647 | | |
| **NOx** | 1.214 | | |
| **CO** | 6.601 | | |
| **SOx** | 0.008 | 100 | No |
| **PM 10** | 0.823 | | |
| **PM 2.5** | 0.044 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 542.5 | | |
| Tanguisson, GU | | | |
| **VOC** | 0.647 | | |
| **NOx** | 1.214 | | |
| **CO** | 6.601 | | |
| **SOx** | 0.008 | 100 | No |
| **PM 10** | 0.823 | | |
| **PM 2.5** | 0.044 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 542.5 | | |
| Piti-Cabras, GU | | | |
| **VOC** | 0.647 | | |
| **NOx** | 1.214 | | |
| **CO** | 6.601 | | |
| **SOx** | 0.008 | 100 | No |
| **PM 10** | 0.823 | | |
| **PM 2.5** | 0.044 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.050 | | |
| **CO2e** | 542.5 | | |

**2023 - (Steady State)**

| Pollutant | Action Emissions (ton/yr) | GENERAL CONFORMITY | |
|---|---|---|---|
| | | Threshold (ton/yr) | Exceedance (Yes or No) |
| NOT IN A REGULATORY AREA | | | |
| **VOC** | 0.305 | | |
| **NOx** | 0.250 | | |
| **CO** | 4.995 | | |
| **SOx** | 0.004 | | |
| **PM 10** | 0.013 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.046 | | |
| **CO2e** | 241.2 | | |
| Piti, GU | | | |
| **VOC** | 0.305 | | |
| **NOx** | 0.250 | | |
| **CO** | 4.995 | | |
| **SOx** | 0.004 | 100 | No |
| **PM 10** | 0.013 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.046 | | |
| **CO2e** | 241.2 | | |
| Tanguisson, GU | | | |
| **VOC** | 0.305 | | |
| **NOx** | 0.250 | | |
| **CO** | 4.995 | | |
| **SOx** | 0.004 | 100 | No |
| **PM 10** | 0.013 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.046 | | |
| **CO2e** | 241.2 | | |
| Piti-Cabras, GU | | | |
| **VOC** | 0.305 | | |
| **NOx** | 0.250 | | |
| **CO** | 4.995 | | |
| **SOx** | 0.004 | 100 | No |
| **PM 10** | 0.013 | | |
| **PM 2.5** | 0.007 | | |
| **Pb** | 0.000 | | |
| **NH3** | 0.046 | | |
| **CO2e** | 241.2 | | |

None of estimated emissions associated with this action are above the conformity threshold values established at 40 CFR 93.153 (b); Therefore, the requirements of the General Conformity Rule are not applicable.

Drea Traeumer, Environmental Scientist

03/08/2021
DATE

# Appendix B-3

# Detailed Air Conformity Applicability Model Reports

# Space Control Squadron Beddown

# for SPCS #4 and SPCS #5 Basing Actions EA

(For General Conformity Applicability Determination and National Environmental Policy Act Air Quality Assessment)

# Alternative A: SPCS #4 PMRF-Barking Sands

## 1. General Information

**- Action Location**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Kaua'i
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**- Project Number/s (if applicable):** Not Applicable

**- Projected Action Start Date:** 1 / 2022

**- Action Purpose and Need:**
The purpose of the Proposed Action is for the U.S. Air Force to provide the facilities and locations suitable for the establishment of two Air National Guard (ANG) Space Control Squadrons (SPCS) locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. SPCS #4 is needed in order to meet the 2015 AFSPC/CC ARC Initiative priority to generate four additional ANG unit-equipped UTCs to meet CCMD needs for offensive space control. SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet CCMD requirements for defensive space control.

**- Action Description:**
The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua'i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O'ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing an 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**- Point of Contact**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**- Activity List: Alternative A - SPCS #4 PMRF-Barking Sands**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | SPCS #4 construct 883 sf addition to existing building |
| 3. | Construction / Demolition | SPCS #4 construct 2,500 sy asphalt parking lot and 5,000 sy concrete equipment pad |
| 4. | Construction / Demolition | SPCS #4 construct 696 cubic yard infiltration basin |
| 5. | Personnel | SPCS #4 add 115 ANG personnel |
| 6. | Construction / Demolition | SPCS #4 renovate 11,217 sf of existing building |

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

### 2.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kaua‘i
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 construct 883 sf addition to existing building

**- Activity Description:**
Demolish 883 sf of existing parking lot adjacent to existing building, and construct 883 sf addition to existing building.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 12
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.195273 |
| $SO_x$ | 0.002629 |
| $NO_x$ | 0.817297 |
| CO | 1.129017 |
| PM 10 | 0.033094 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.030951 |
| Pb | 0.000000 |
| $NH_3$ | 0.000739 |
| $CO_2e$ | 254.1 |
| | |

### 2.1 Demolition Phase

#### 2.1.1 Demolition Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1

**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

**2.1.2 Demolition Phase Assumptions**

**- General Demolition Information**
**Area of Building to be demolished ($ft^2$):** 883
**Height of Building to be demolished (ft):** 0.5

**- Default Settings Used:** Yes

**- Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Concrete/Industrial Saws Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 1 |
| Tractors/Loaders/Backhoes Composite | 2 | 6 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.1.3 Demolition Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Concrete/Industrial Saws Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0410 | 0.0006 | 0.2961 | 0.3743 | 0.0148 | 0.0148 | 0.0037 | 58.556 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.1.4 Demolition Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/$ft^3$)
BA: Area of Building to be demolished ($ft^2$)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE}$ = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish ($ft^2$)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**2.2 Site Grading Phase**

**2.2.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 5

**2.2.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 883
**Amount of Material to be Hauled On-Site ($yd^3$):** 16
**Amount of Material to be Hauled Off-Site ($yd^3$):** 16

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.2.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.2.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 2.3 Building Construction Phase

#### 2.3.1 Building Construction Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 12
**Number of Days:** 0

#### 2.3.2 Building Construction Phase Assumptions

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 883
**Height of Building (ft):** 35
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cranes Composite | 1 | 4 |
| Forklifts Composite | 2 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40 (default)

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**2.3.3 Building Construction Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Cranes Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0797 | 0.0013 | 0.5505 | 0.3821 | 0.0203 | 0.0203 | 0.0071 | 128.81 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 2.3.4 Building Construction Phase Formula(s)

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**2.4 Architectural Coatings Phase**

**2.4.1 Architectural Coatings Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**2.4.2 Architectural Coatings Phase Assumptions**

**- General Architectural Coatings Information**
**Building Category:** Non-Residential
**Total Square Footage ($ft^2$):** 4160
**Number of Units:** N/A

**- Architectural Coatings Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.4.3 Architectural Coatings Phase Emission Factor(s)**

**- Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.4.4 Architectural Coatings Phase Formula(s)**

**- Worker Trips Emissions per Phase**
$VMT_{WT} = (1 * WT * PA) / 800$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area ($ft^2$)
800: Conversion Factor square feet to man days (1 $ft^2$ / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

$VOC_{AC}$: Architectural Coating VOC Emissions (TONs)
BA: Area of Building ($ft^2$)
2.0: Conversion Factor total area to coated area (2.0 $ft^2$ coated area / total area)
0.0116: Emission Factor ($lb/ft^2$)
2000: Conversion Factor pounds to tons

## 3. Construction / Demolition

### 3.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kaua‘i
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 construct 2,500 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Description:**
Demolish 7,500 sy of existing asphalt parking lot and construct 2,500 parking lot and 5,000 sy concrete equipment pad.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.028813 |
| $SO_x$ | 0.000418 |
| $NO_x$ | 0.168330 |
| CO | 0.188841 |
| PM 10 | 0.236290 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.007782 |
| Pb | 0.000000 |
| $NH_3$ | 0.000196 |
| $CO_2e$ | 42.0 |
| | |

**3.1 Demolition Phase**

**3.1.1 Demolition Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

**3.1.2 Demolition Phase Assumptions**

**- General Demolition Information**
**Area of Building to be demolished ($ft^2$):** 67500
**Height of Building to be demolished (ft):** 0.5

**- Default Settings Used:** Yes

**- Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Concrete/Industrial Saws Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 1 |
| Tractors/Loaders/Backhoes Composite | 2 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 3.1.3 Demolition Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Concrete/Industrial Saws Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0410 | 0.0006 | 0.2961 | 0.3743 | 0.0148 | 0.0148 | 0.0037 | 58.556 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 3.1.4 Demolition Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor (lb/ft$^3$)
BA: Area of Building to be demolished (ft$^2$)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish (ft$^2$)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd$^3$ / 27 ft$^3$)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity (yd$^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd$^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**3.2 Site Grading Phase**

**3.2.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**3.2.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 67500
**Amount of Material to be Hauled On-Site ($yd^3$):** 1250
**Amount of Material to be Hauled Off-Site ($yd^3$):** 1250

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**

**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**3.2.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**3.2.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 3.3 Paving Phase

#### 3.3.1 Paving Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

#### 3.3.2 Paving Phase Assumptions

**- General Paving Information**
**Paving Area ($ft^2$):** 67500

**- Paving Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cement and Mortar Mixers Composite | 4 | 6 |
| Pavers Composite | 1 | 7 |
| Paving Equipment Composite | 2 | 6 |
| Rollers Composite | 1 | 7 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

#### 3.3.3 Paving Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |

| Rubber Tired Dozers Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 3.3.4 Paving Phase Formula(s)

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area ($ft^2$)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_P$ = (2.62 * PA) / 43560

$VOC_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area ($ft^2$)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)$^2$ / acre)

# 4. Construction / Demolition

### 4.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kaua‘i
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 construct 696 cubic yard infiltration basin

**- Activity Description:**
Construct 696 cubic yard infiltration basin to contain runoff from new impervious surfaces using 95th percentile design rainfall depth of 2.64 inches.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.015288 |
| $SO_x$ | 0.000294 |
| $NO_x$ | 0.082845 |
| CO | 0.112086 |
| PM 10 | 0.451901 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.003360 |
| Pb | 0.000000 |
| $NH_3$ | 0.000057 |
| $CO_2e$ | 28.0 |
| | |

### 4.1 Trenching/Excavating Phase

#### 4.1.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

**4.1.2 Trenching / Excavating Phase Assumptions**

**- General Trenching/Excavating Information**
**Area of Site to be Trenched/Excavated ($ft^2$):** 68383
**Amount of Material to be Hauled On-Site ($yd^3$):** 1
**Amount of Material to be Hauled Off-Site ($yd^3$):** 696

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipment Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**4.1.3 Trenching / Excavating Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.569 | 000.008 | 000.606 | 005.120 | 000.008 | 000.007 | | 000.034 | 00381.013 |
| LDGT | 000.807 | 000.010 | 001.051 | 008.641 | 000.009 | 000.008 | | 000.034 | 00508.378 |
| HDGV | 001.513 | 000.016 | 002.777 | 026.893 | 000.020 | 000.018 | | 000.046 | 00789.086 |
| LDDV | 000.207 | 000.003 | 000.305 | 003.836 | 000.006 | 000.006 | | 000.008 | 00391.624 |
| LDDT | 000.520 | 000.005 | 000.815 | 007.812 | 000.008 | 000.008 | | 000.008 | 00609.856 |
| HDDV | 000.593 | 000.014 | 006.848 | 002.466 | 000.375 | 000.345 | | 000.026 | 01559.210 |
| MC | 002.959 | 000.008 | 000.696 | 014.613 | 000.026 | 000.023 | | 000.049 | 00391.464 |

**4.1.4 Trenching / Excavating Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# 5. Personnel

**5.1 General Information & Timeline Assumptions**

**- Add or Remove Activity from Baseline?** Add

**- Activity Location**
**County:** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 add 115 ANG personnel

**- Activity Description:**
SPCS #4 add 115 ANG personnel.

**- Activity Start Date**
**Start Month:** 1
**Start Year:** 2022

**- Activity End Date**
**Indefinite:** Yes
**End Month:** N/A
**End Year:** N/A

**- Activity Emissions:**

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| VOC | 0.202667 |
| $SO_x$ | 0.001385 |
| $NO_x$ | 0.167359 |
| CO | 2.410054 |
| PM 10 | 0.003476 |

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| PM 2.5 | 0.003137 |
| Pb | 0.000000 |
| $NH_3$ | 0.012732 |
| $CO_2e$ | 206.4 |
| | |

**5.2 Personnel Assumptions**

**- Number of Personnel**
**Active Duty Personnel:** 0
**Civilian Personnel:** 0
**Support Contractor Personnel:** 0
**Air National Guard (ANG) Personnel:** 115
**Reserve Personnel:** 0

**- Default Settings Used:** Yes

**- Average Personnel Round Trip Commute (mile):** 20 (default)

**- Personnel Work Schedule**
**Active Duty Personnel:** 5 Days Per Week (default)
**Civilian Personnel:** 5 Days Per Week (default)
**Support Contractor Personnel:** 5 Days Per Week (default)

**Air National Guard (ANG) Personnel:** 4 Days Per Week (default)
**Reserve Personnel:** 4 Days Per Month (default)

### 5.3 Personnel On Road Vehicle Mixture

**- On Road Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 37.55 | 60.32 | 0 | 0.03 | 0.2 | 0 | 1.9 |
| GOVs | 54.49 | 37.73 | 4.67 | 0 | 0 | 3.11 | 0 |

### 5.4 Personnel Emission Factor(s)

**- On Road Vehicle Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 5.5 Personnel Formula(s)

**- Personnel Vehicle Miles Travel for Work Days per Year**
$VMT_P = NP * WD * AC$

$VMT_P$: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

**- Total Vehicle Miles Travel per Year**
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

$VMT_{Total}$: Total Vehicle Miles Travel (miles)
$VMT_{AD}$: Active Duty Personnel Vehicle Miles Travel (miles)
$VMT_C$: Civilian Personnel Vehicle Miles Travel (miles)
$VMT_{SC}$: Support Contractor Personnel Vehicle Miles Travel (miles)
$VMT_{ANG}$: Air National Guard Personnel Vehicle Miles Travel (miles)
$VMT_{AFRC}$: Reserve Personnel Vehicle Miles Travel (miles)

**- Vehicle Emissions per Year**
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{Total}$: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 6. Construction / Demolition

**6.1 General Information & Timeline Assumptions**

**- Activity Location**
**County:** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 renovate 11,217 sf of existing building

**- Activity Description:**
Renovate 11,217 sf of existing building

For renovation, crane operation removed from default building construction activity equipment and one aerial lift was added for 3 hrs/day, and one other material handling equipment was added for six hrs/day.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 7
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.091586 |
| $SO_x$ | 0.001727 |
| $NO_x$ | 0.515861 |
| CO | 0.691551 |
| PM 10 | 0.019682 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.019583 |
| Pb | 0.000000 |
| $NH_3$ | 0.000633 |
| $CO_2e$ | 167.5 |
| | |

**6.1 Building Construction Phase**

**6.1.1 Building Construction Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 6
**Number of Days:** 14

**6.1.2 Building Construction Phase Assumptions**

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 11217
**Height of Building (ft):** 35
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** No

**Average Day(s) worked per week:** 5

**- Construction Exhaust**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Aerial Lifts Composite | 1 | 3 |
| Forklifts Composite | 2 | 6 |
| Other Material Handling Equipment Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**6.1.3 Building Construction Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour)**

| Aerial Lifts Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0221 | 0.0003 | 0.1619 | 0.1666 | 0.0070 | 0.0070 | 0.0020 | 34.771 |
| **Forklifts Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Other Material Handling Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0812 | 0.0015 | 0.5158 | 0.4377 | 0.0191 | 0.0191 | 0.0073 | 141.37 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 6.1.4 Building Construction Phase Formula(s)

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**

$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# Alternative A: SPCS #5 PMRF-Barking Sands

## 1. General Information

**- Action Location**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**- Project Number/s (if applicable):** Not Applicable

**- Projected Action Start Date:** 1 / 2022

**- Action Purpose and Need:**
The purpose of the Proposed Action is for the U.S. Air Force to provide the facilities and locations suitable for the establishment of two Air National Guard (ANG) Space Control Squadrons (SPCS) locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. SPCS #4 is needed in order to meet the 2015 AFSPC/CC ARC Initiative priority to generate four additional ANG unit-equipped UTCs to meet CCMD needs for offensive space control. SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet CCMD requirements for defensive space control.

**- Action Description:**
The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kauaʻi, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, Oʻahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing a 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**- Point of Contact**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**- Activity List: Alternative A - SPCS #5 PMRF-Barking Sands**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | SPCS #5 construct 883 sf addition to existing building |
| 3. | Construction / Demolition | SPCS #5 construct 2,500 sy asphalt parking lot and 5,000 sy concrete equipment pad |
| 4. | Construction / Demolition | SPCS #5 construct 696 cubic yard infiltration basin |

| | | |
|---|---|---|
| 5. | Personnel | SPCS #5 add 105 ANG personnel |
| 6. | Construction / Demolition | SPCS #5 renovate 11,217 sf of existing building |

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

### 2.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 construct 883 sf addition to existing building

**- Activity Description:**
Demolish 883 sf of existing parking lot adjacent to existing building, and construct 883 sf addition to existing building.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 12
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.195273 |
| $SO_x$ | 0.002629 |
| $NO_x$ | 0.817297 |
| CO | 1.129017 |
| PM 10 | 0.033094 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.030951 |
| Pb | 0.000000 |
| $NH_3$ | 0.000739 |
| $CO_2e$ | 254.1 |
| | |

### 2.1 Demolition Phase

### 2.1.1 Demolition Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

### 2.1.2 Demolition Phase Assumptions

**- General Demolition Information**
**Area of Building to be demolished ($ft^2$):** 883
**Height of Building to be demolished (ft):** 0.5

**- Default Settings Used:** Yes

**- Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Concrete/Industrial Saws Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 1 |
| Tractors/Loaders/Backhoes Composite | 2 | 6 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.1.3 Demolition Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Concrete/Industrial Saws Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0410 | 0.0006 | 0.2961 | 0.3743 | 0.0148 | 0.0148 | 0.0037 | 58.556 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 2.1.4 Demolition Phase Formula(s)

**- Fugitive Dust Emissions per Phase**
$PM10_{FD} = (0.00042 * BA * BH) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor ($lb/ft^3$)
BA: Area of Building to be demolished ($ft^2$)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish ($ft^2$)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards ($1\ yd^3 / 27\ ft^3$)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips ($1\ trip / HC\ yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 2.2 Site Grading Phase

### 2.2.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 5

### 2.2.2 Site Grading Phase Assumptions

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 883
**Amount of Material to be Hauled On-Site ($yd^3$):** 16
**Amount of Material to be Hauled Off-Site ($yd^3$):** 16

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.2.3 Site Grading Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 2.2.4 Site Grading Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 2.3 Building Construction Phase

### 2.3.1 Building Construction Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 12
**Number of Days:** 0

### 2.3.2 Building Construction Phase Assumptions

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 883
**Height of Building (ft):** 35
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cranes Composite | 1 | 4 |

| | | |
|---|---|---|
| Forklifts Composite | 2 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40 (default)

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

## 2.3.3 Building Construction Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Cranes Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0797 | 0.0013 | 0.5505 | 0.3821 | 0.0203 | 0.0203 | 0.0071 | 128.81 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

## 2.3.4 Building Construction Phase Formula(s)

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

## 2.4 Architectural Coatings Phase

### 2.4.1 Architectural Coatings Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

### 2.4.2 Architectural Coatings Phase Assumptions

**- General Architectural Coatings Information**
**Building Category:** Non-Residential
**Total Square Footage ($ft^2$):** 4160
**Number of Units:** N/A

**- Architectural Coatings Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.4.3 Architectural Coatings Phase Emission Factor(s)

**- Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 2.4.4 Architectural Coatings Phase Formula(s)

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = (1 * WT * PA) / 800

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area ($ft^2$)
800: Conversion Factor square feet to man days (1 $ft^2$ / 1 man * day)

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_{AC}$ = (AB * 2.0 * 0.0116) / 2000.0

$VOC_{AC}$: Architectural Coating VOC Emissions (TONs)
BA: Area of Building ($ft^2$)
2.0: Conversion Factor total area to coated area (2.0 $ft^2$ coated area / total area)
0.0116: Emission Factor ($lb/ft^2$)
2000: Conversion Factor pounds to tons

# 3. Construction / Demolition

## 3.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 construct 2,500 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Description:**
Demolish 7,500 sy of existing asphalt parking lot and construct 2,500 parking lot and 5,000 sy concrete equipment pad.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.028813 |
| $SO_x$ | 0.000418 |
| $NO_x$ | 0.168330 |
| CO | 0.188841 |
| PM 10 | 0.236290 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.007782 |
| Pb | 0.000000 |
| $NH_3$ | 0.000196 |
| $CO_2e$ | 42.0 |
| | |

## 3.1 Demolition Phase

### 3.1.1 Demolition Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

### 3.1.2 Demolition Phase Assumptions

**- General Demolition Information**
**Area of Building to be demolished ($ft^2$):** 67500
**Height of Building to be demolished (ft):** 0.5

**- Default Settings Used:** Yes

**- Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Concrete/Industrial Saws Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 1 |
| Tractors/Loaders/Backhoes Composite | 2 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 3.1.3 Demolition Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Concrete/Industrial Saws Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0410 | 0.0006 | 0.2961 | 0.3743 | 0.0148 | 0.0148 | 0.0037 | 58.556 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 3.1.4 Demolition Phase Formula(s)

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (0.00042 * BA * BH) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
0.00042: Emission Factor ($lb/ft^3$)
BA: Area of Building to be demolished ($ft^2$)
BH: Height of Building to be demolished (ft)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE}$ = BA * BH * (1 / 27) * 0.25 * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building being demolish ($ft^2$)
BH: Height of Building being demolish (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
0.25: Volume reduction factor (material reduced by 75% to account for air space)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 3.2 Site Grading Phase

### 3.2.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

### 3.2.2 Site Grading Phase Assumptions

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 67500
**Amount of Material to be Hauled On-Site ($yd^3$):** 1250
**Amount of Material to be Hauled Off-Site ($yd^3$):** 1250

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 3.2.3 Site Grading Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Graders Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 3.2.4 Site Grading Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 3.3 Paving Phase

### 3.3.1 Paving Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

### 3.3.2 Paving Phase Assumptions

**- General Paving Information**
**Paving Area ($ft^2$):** 67500

**- Paving Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cement and Mortar Mixers Composite | 4 | 6 |
| Pavers Composite | 1 | 7 |
| Paving Equipment Composite | 2 | 6 |
| Rollers Composite | 1 | 7 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 3.3.3 Paving Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 3.3.4 Paving Phase Formula(s)

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)

NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area ($ft^2$)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_P = (2.62 * PA) / 43560$

$VOC_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area ($ft^2$)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)$^2$ / acre)

## 4. Construction / Demolition

## 4.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 construct 696 cubic yard infiltration basin

**- Activity Description:**
Construct 696 cubic yard infiltration basin to contain runoff from new impervious surfaces using 95th percentile design rainfall depth of 2.64 inches.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.015288 |
| $SO_x$ | 0.000294 |
| $NO_x$ | 0.082845 |
| CO | 0.112086 |
| PM 10 | 0.451901 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.003360 |
| Pb | 0.000000 |
| $NH_3$ | 0.000057 |
| $CO_2e$ | 28.0 |
| | |

## 4.1 Trenching/Excavating Phase

### 4.1.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

### 4.1.2 Trenching / Excavating Phase Assumptions

**- General Trenching/Excavating Information**
**Area of Site to be Trenched/Excavated ($ft^2$):** 68383
**Amount of Material to be Hauled On-Site ($yd^3$):** 1
**Amount of Material to be Hauled Off-Site ($yd^3$):** 696

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipment Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**

**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 4.1.3 Trenching / Excavating Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.569 | 000.008 | 000.606 | 005.120 | 000.008 | 000.007 | | 000.034 | 00381.013 |
| LDGT | 000.807 | 000.010 | 001.051 | 008.641 | 000.009 | 000.008 | | 000.034 | 00508.378 |
| HDGV | 001.513 | 000.016 | 002.777 | 026.893 | 000.020 | 000.018 | | 000.046 | 00789.086 |
| LDDV | 000.207 | 000.003 | 000.305 | 003.836 | 000.006 | 000.006 | | 000.008 | 00391.624 |
| LDDT | 000.520 | 000.005 | 000.815 | 007.812 | 000.008 | 000.008 | | 000.008 | 00609.856 |
| HDDV | 000.593 | 000.014 | 006.848 | 002.466 | 000.375 | 000.345 | | 000.026 | 01559.210 |
| MC | 002.959 | 000.008 | 000.696 | 014.613 | 000.026 | 000.023 | | 000.049 | 00391.464 |

### 4.1.4 Trenching / Excavating Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# 5. Personnel

## 5.1 General Information & Timeline Assumptions

**- Add or Remove Activity from Baseline?** Add

**- Activity Location**
**County:** Kauaʻi
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 add 105 ANG personnel

**- Activity Description:**
SPCS #5 add 105 ANG personnel.

**- Activity Start Date**
**Start Month:** 1
**Start Year:** 2022

**- Activity End Date**
**Indefinite:** Yes
**End Month:** N/A
**End Year:** N/A

**- Activity Emissions:**

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| VOC | 0.185044 |
| $SO_x$ | 0.001265 |
| $NO_x$ | 0.152806 |
| CO | 2.200484 |
| PM 10 | 0.003174 |

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| PM 2.5 | 0.002864 |
| Pb | 0.000000 |
| $NH_3$ | 0.011625 |
| $CO_2e$ | 188.4 |
| | |

## 5.2 Personnel Assumptions

**- Number of Personnel**
**Active Duty Personnel:** 0
**Civilian Personnel:** 0
**Support Contractor Personnel:** 0
**Air National Guard (ANG) Personnel:** 105
**Reserve Personnel:** 0

**- Default Settings Used:** Yes

**- Average Personnel Round Trip Commute (mile):** 20 (default)

**- Personnel Work Schedule**
**Active Duty Personnel:** 5 Days Per Week (default)
**Civilian Personnel:** 5 Days Per Week (default)
**Support Contractor Personnel:** 5 Days Per Week (default)
**Air National Guard (ANG) Personnel:** 4 Days Per Week (default)
**Reserve Personnel:** 4 Days Per Month (default)

## 5.3 Personnel On Road Vehicle Mixture

**- On Road Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 37.55 | 60.32 | 0 | 0.03 | 0.2 | 0 | 1.9 |
| GOVs | 54.49 | 37.73 | 4.67 | 0 | 0 | 3.11 | 0 |

## 5.4 Personnel Emission Factor(s)

**- On Road Vehicle Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 5.5 Personnel Formula(s)

**- Personnel Vehicle Miles Travel for Work Days per Year**
$VMT_P = NP * WD * AC$

$VMT_P$: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

**- Total Vehicle Miles Travel per Year**
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

$VMT_{Total}$: Total Vehicle Miles Travel (miles)
$VMT_{AD}$: Active Duty Personnel Vehicle Miles Travel (miles)
$VMT_C$: Civilian Personnel Vehicle Miles Travel (miles)
$VMT_{SC}$: Support Contractor Personnel Vehicle Miles Travel (miles)
$VMT_{ANG}$: Air National Guard Personnel Vehicle Miles Travel (miles)
$VMT_{AFRC}$: Reserve Personnel Vehicle Miles Travel (miles)

**- Vehicle Emissions per Year**
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{Total}$: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 6. Construction / Demolition

### 6.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Kaua‘i
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 renovate 11,217 sf of existing building

**- Activity Description:**
Renovate 11,217 sf of existing building

For renovation, crane operation removed from default building construction activity equipment and one aerial lift was added for 3 hrs/day, and one other material handling equipment was added for six hrs/day.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 7
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.091586 |
| $SO_x$ | 0.001727 |
| $NO_x$ | 0.515861 |
| CO | 0.691551 |
| PM 10 | 0.019682 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.019583 |
| Pb | 0.000000 |
| $NH_3$ | 0.000633 |
| $CO_2e$ | 167.5 |
| | |

### 6.1 Building Construction Phase

### 6.1.1 Building Construction Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 6
**Number of Days:** 14

### 6.1.2 Building Construction Phase Assumptions

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 11217
**Height of Building (ft):** 35
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** No
**Average Day(s) worked per week:** 5

**- Construction Exhaust**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Aerial Lifts Composite | 1 | 3 |
| Forklifts Composite | 2 | 6 |
| Other Material Handling Equipment Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

### 6.1.3 Building Construction Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour)**

| **Aerial Lifts Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0221 | 0.0003 | 0.1619 | 0.1666 | 0.0070 | 0.0070 | 0.0020 | 34.771 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Other Material Handling Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0812 | 0.0015 | 0.5158 | 0.4377 | 0.0191 | 0.0191 | 0.0073 | 141.37 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 6.1.4 Building Construction Phase Formula(s)

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)

BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT}$ = BA * BH * (0.38 / 1000) * HT

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# Alternative B: SPCS #4 JBPH-Hickam

## 1. General Information

**- Action Location**

**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**- Project Number/s (if applicable):** Not Applicable

**- Projected Action Start Date:** 1 / 2022

**- Action Purpose and Need:**

The purpose of the Proposed Action is for the U.S. Air Force to provide the facilities and locations suitable for the establishment of two Air National Guard (ANG) Space Control Squadrons (SPCS) locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. SPCS #4 is needed in order to meet the 2015 AFSPC/CC ARC Initiative priority to generate four additional ANG unit-equipped UTCs to meet CCMD needs for offensive space control. SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet CCMD requirements for defensive space control.

**- Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua‘i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O‘ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing an 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**- Point of Contact**

**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**- Activity List: Alternative B - SPCS #4 JBPH-Hickam**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | SPCS #4 construct 12,100 sf building. |
| 3. | Construction / Demolition | SPCS #4 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad. |
| 4. | Construction / Demolition | SPCS #4 construct 648 cubic yard infiltration basin |
| 5. | Personnel | SPCS #4 add 115 ANG personnel |

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

### 2.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 construct 12,100 sf building.

**- Activity Description:**
Construct 12,100 sf building.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 12
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.293636 |
| $SO_x$ | 0.002610 |
| $NO_x$ | 0.796639 |
| CO | 1.075831 |
| PM 10 | 0.057918 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.030022 |
| Pb | 0.000000 |
| $NH_3$ | 0.000899 |
| $CO_2e$ | 253.8 |
| | |

### 2.1 Site Grading Phase

#### 2.1.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 5

### 2.1.2 Site Grading Phase Assumptions

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 12100
**Amount of Material to be Hauled On-Site ($yd^3$):** 224
**Amount of Material to be Hauled Off-Site ($yd^3$):** 224

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 2.1.3 Site Grading Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Graders Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**2.2 Building Construction Phase**

**2.2.1 Building Construction Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 12
**Number of Days:** 0

**2.2.2 Building Construction Phase Assumptions**

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 12100
**Height of Building (ft):** 35
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cranes Composite | 1 | 4 |
| Forklifts Composite | 2 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**

**Average Vendor Round Trip Commute (mile):** 40 (default)

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**2.2.3 Building Construction Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Cranes Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0797 | 0.0013 | 0.5505 | 0.3821 | 0.0203 | 0.0203 | 0.0071 | 128.81 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.2.4 Building Construction Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 2.3 Architectural Coatings Phase

### 2.3.1 Architectural Coatings Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0

**Number of Days:** 10

**2.3.2 Architectural Coatings Phase Assumptions**

**- General Architectural Coatings Information**
**Building Category:** Non-Residential
**Total Square Footage ($ft^2$):** 13090
**Number of Units:** N/A

**- Architectural Coatings Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.3.3 Architectural Coatings Phase Emission Factor(s)**

**- Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.3.4 Architectural Coatings Phase Formula(s)**

**- Worker Trips Emissions per Phase**
$VMT_{WT} = (1 * WT * PA) / 800$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area ($ft^2$)
800: Conversion Factor square feet to man days (1 $ft^2$ / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

$VOC_{AC}$: Architectural Coating VOC Emissions (TONs)

BA: Area of Building ($ft^2$)
2.0: Conversion Factor total area to coated area (2.0 $ft^2$ coated area / total area)
0.0116: Emission Factor ($lb/ft^2$)
2000: Conversion Factor pounds to tons

## 3. Construction / Demolition

### 3.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Description:**
Construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.020105 |
| $SO_x$ | 0.000278 |
| $NO_x$ | 0.113713 |
| CO | 0.113954 |
| PM 10 | 0.226822 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.005406 |
| Pb | 0.000000 |
| $NH_3$ | 0.000150 |
| $CO_2e$ | 28.2 |
| | |

### 3.1 Site Grading Phase

### 3.1.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

### 3.1.2 Site Grading Phase Assumptions

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 67500
**Amount of Material to be Hauled On-Site ($yd^3$):** 1250
**Amount of Material to be Hauled Off-Site ($yd^3$):** 1250

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**3.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**3.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 3.2 Paving Phase

#### 3.2.1 Paving Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

#### 3.2.2 Paving Phase Assumptions

**- General Paving Information**
**Paving Area ($ft^2$):** 67500

**- Paving Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cement and Mortar Mixers Composite | 4 | 6 |
| Pavers Composite | 1 | 7 |
| Paving Equipment Composite | 2 | 6 |
| Rollers Composite | 1 | 7 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

#### 3.2.3 Paving Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |

| **Rubber Tired Dozers Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **Pb** | **$NH_3$** | **$CO_2e$** |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**3.2.4 Paving Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area ($ft^2$)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_P = (2.62 * PA) / 43560$

$VOC_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area ($ft^2$)
43560: Conversion Factor square feet to acre ($(43560\ ft2\ /\ acre)^2$ / acre)

# 4. Construction / Demolition

### 4.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 construct 648 cubic yard infiltration basin

**- Activity Description:**
Construct 648 cubic yard infiltration basin to contain runoff from new impervious surface using 95th percentile design rainfall depth of 2.11 inches.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.015272 |
| $SO_x$ | 0.000293 |
| $NO_x$ | 0.082658 |
| CO | 0.112014 |
| PM 10 | 0.525466 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.003352 |
| Pb | 0.000000 |
| $NH_3$ | 0.000056 |
| $CO_2e$ | 27.9 |
| | |

### 4.1 Trenching/Excavating Phase

#### 4.1.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

**4.1.2 Trenching / Excavating Phase Assumptions**

**- General Trenching/Excavating Information**
**Area of Site to be Trenched/Excavated ($ft^2$):** 79600
**Amount of Material to be Hauled On-Site ($yd^3$):** 1
**Amount of Material to be Hauled Off-Site ($yd^3$):** 648

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipment Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**4.1.3 Trenching / Excavating Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.569 | 000.008 | 000.606 | 005.120 | 000.008 | 000.007 | | 000.034 | 00381.013 |
| LDGT | 000.807 | 000.010 | 001.051 | 008.641 | 000.009 | 000.008 | | 000.034 | 00508.378 |
| HDGV | 001.513 | 000.016 | 002.777 | 026.893 | 000.020 | 000.018 | | 000.046 | 00789.086 |
| LDDV | 000.207 | 000.003 | 000.305 | 003.836 | 000.006 | 000.006 | | 000.008 | 00391.624 |
| LDDT | 000.520 | 000.005 | 000.815 | 007.812 | 000.008 | 000.008 | | 000.008 | 00609.856 |
| HDDV | 000.593 | 000.014 | 006.848 | 002.466 | 000.375 | 000.345 | | 000.026 | 01559.210 |
| MC | 002.959 | 000.008 | 000.696 | 014.613 | 000.026 | 000.023 | | 000.049 | 00391.464 |

**4.1.4 Trenching / Excavating Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# 5. Personnel

**5.1 General Information & Timeline Assumptions**

**- Add or Remove Activity from Baseline?** Add

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #4 add 115 ANG personnel

**- Activity Description:**
SPCS #4 add 115 ANG personnel.

**- Activity Start Date**
**Start Month:** 1
**Start Year:** 2022

**- Activity End Date**
**Indefinite:** Yes
**End Month:** N/A
**End Year:** N/A

**- Activity Emissions:**

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| VOC | 0.202667 |
| $SO_x$ | 0.001385 |
| $NO_x$ | 0.167359 |
| CO | 2.410054 |
| PM 10 | 0.003476 |

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| PM 2.5 | 0.003137 |
| Pb | 0.000000 |
| $NH_3$ | 0.012732 |
| $CO_2e$ | 206.4 |
| | |

**5.2 Personnel Assumptions**

**- Number of Personnel**
**Active Duty Personnel:** 0
**Civilian Personnel:** 0
**Support Contractor Personnel:** 0
**Air National Guard (ANG) Personnel:** 115
**Reserve Personnel:** 0

**- Default Settings Used:** Yes

**- Average Personnel Round Trip Commute (mile):** 20 (default)

**- Personnel Work Schedule**
**Active Duty Personnel:** 5 Days Per Week (default)
**Civilian Personnel:** 5 Days Per Week (default)
**Support Contractor Personnel:** 5 Days Per Week (default)
**Air National Guard (ANG) Personnel:** 4 Days Per Week (default)

**Reserve Personnel:** 4 Days Per Month (default)

**5.3 Personnel On Road Vehicle Mixture**

**- On Road Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 37.55 | 60.32 | 0 | 0.03 | 0.2 | 0 | 1.9 |
| GOVs | 54.49 | 37.73 | 4.67 | 0 | 0 | 3.11 | 0 |

**5.4 Personnel Emission Factor(s)**

**- On Road Vehicle Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**5.5 Personnel Formula(s)**

**- Personnel Vehicle Miles Travel for Work Days per Year**
$VMT_P = NP * WD * AC$

$VMT_P$: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

**- Total Vehicle Miles Travel per Year**
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

$VMT_{Total}$: Total Vehicle Miles Travel (miles)
$VMT_{AD}$: Active Duty Personnel Vehicle Miles Travel (miles)
$VMT_C$: Civilian Personnel Vehicle Miles Travel (miles)
$VMT_{SC}$: Support Contractor Personnel Vehicle Miles Travel (miles)
$VMT_{ANG}$: Air National Guard Personnel Vehicle Miles Travel (miles)
$VMT_{AFRC}$: Reserve Personnel Vehicle Miles Travel (miles)

**- Vehicle Emissions per Year**
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{Total}$: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# Alternative B: SPCS #5 JBPH-Hickam

## 1. General Information

**- Action Location**
**Base:** HICKAM AFB
**State:** Hawaii
**County(s):** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam
**- Project Number/s (if applicable):** Not Applicable

**- Projected Action Start Date:** 1 / 2022

**- Action Purpose and Need:**
The purpose of the Proposed Action is for the U.S. Air Force to provide the facilities and locations suitable for the establishment of two Air National Guard (ANG) Space Control Squadrons (SPCS) locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. SPCS #4 is needed in order to meet the 2015 AFSPC/CC ARC Initiative priority to generate four additional ANG unit-equipped UTCs to meet CCMD needs for offensive space control. SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet CCMD requirements for defensive space control.

**- Action Description:**
The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua‘i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O‘ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing an 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**- Point of Contact**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**- Activity List: Alternative B - SPCS #5 JBPH-Hickam**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | SPCS #5 construct 12,100 sf building. |
| 3. | Construction / Demolition | SPCS #5 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad. |
| 4. | Construction / Demolition | SPCS #5 construct 648 cubic yard infiltration basin |
| 5. | Personnel | SPCS #5 add 105 ANG personnel |

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

### 2.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 construct 12,100 sf building.

**- Activity Description:**
Construct 12,100 sf building.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 12
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.293636 |
| $SO_x$ | 0.002610 |
| $NO_x$ | 0.796639 |
| CO | 1.075831 |
| PM 10 | 0.057918 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.030022 |
| Pb | 0.000000 |
| $NH_3$ | 0.000899 |
| $CO_2e$ | 253.8 |
| | |

### 2.1 Site Grading Phase

#### 2.1.1 Site Grading Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 5

#### 2.1.2 Site Grading Phase Assumptions

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 12100
**Amount of Material to be Hauled On-Site ($yd^3$):** 224
**Amount of Material to be Hauled Off-Site ($yd^3$):** 224

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**2.2 Building Construction Phase**

**2.2.1 Building Construction Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 12
**Number of Days:** 0

**2.2.2 Building Construction Phase Assumptions**

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building (ft$^2$):** 12100
**Height of Building (ft):** 35
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cranes Composite | 1 | 4 |
| Forklifts Composite | 2 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40 (default)

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

### 2.2.3 Building Construction Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Cranes Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0797 | 0.0013 | 0.5505 | 0.3821 | 0.0203 | 0.0203 | 0.0071 | 128.81 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **Pb** | **$NH_3$** | **$CO_2e$** |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

### 2.2.4 Building Construction Phase Formula(s)

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 2.3 Architectural Coatings Phase

#### 2.3.1 Architectural Coatings Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

#### 2.3.2 Architectural Coatings Phase Assumptions

**- General Architectural Coatings Information**
**Building Category:** Non-Residential
**Total Square Footage ($ft^2$):** 13090
**Number of Units:** N/A

**- Architectural Coatings Default Settings**
**Default Settings Used:** Yes

**Average Day(s) worked per week:** 5 (default)

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.3.3 Architectural Coatings Phase Emission Factor(s)**

**- Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**2.3.4 Architectural Coatings Phase Formula(s)**

**- Worker Trips Emissions per Phase**
$VMT_{WT} = (1 * WT * PA) / 800$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area ($ft^2$)
800: Conversion Factor square feet to man days (1 $ft^2$ / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

$VOC_{AC}$: Architectural Coating VOC Emissions (TONs)
BA: Area of Building ($ft^2$)
2.0: Conversion Factor total area to coated area (2.0 $ft^2$ coated area / total area)
0.0116: Emission Factor ($lb/ft^2$)
2000: Conversion Factor pounds to tons

# 3. Construction / Demolition

**3.1 General Information & Timeline Assumptions**

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Description:**
Construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.020105 |
| $SO_x$ | 0.000278 |
| $NO_x$ | 0.113713 |
| CO | 0.113954 |
| PM 10 | 0.226822 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.005406 |
| Pb | 0.000000 |
| $NH_3$ | 0.000150 |
| $CO_2e$ | 28.2 |
| | |

**3.1 Site Grading Phase**

**3.1.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**3.1.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 67500
**Amount of Material to be Hauled On-Site ($yd^3$):** 1250
**Amount of Material to be Hauled Off-Site ($yd^3$):** 1250

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |

| | | |
|---|---|---|
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**

**Average Hauling Truck Capacity ($yd^3$):** 20 (default)

**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**3.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**3.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 3.2 Paving Phase

#### 3.2.1 Paving Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**

**Number of Month:** 0
**Number of Days:** 10

### 3.2.2 Paving Phase Assumptions

**- General Paving Information**
**Paving Area ($ft^2$):** 67500

**- Paving Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cement and Mortar Mixers Composite | 4 | 6 |
| Pavers Composite | 1 | 7 |
| Paving Equipment Composite | 2 | 6 |
| Rollers Composite | 1 | 7 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 3.2.3 Paving Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**3.2.4 Paving Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area ($ft^2$)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_P$ = (2.62 * PA) / 43560

$VOC_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area ($ft^2$)
43560: Conversion Factor square feet to acre (43560 ft2 / acre)$^2$ / acre)

# 4. Construction / Demolition

### 4.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 construct 648 cubic yard infiltration basin

**- Activity Description:**
Construct 648 cubic yard infiltration basin to contain runoff from new impervious surfaces using 95th percentile design rainfall depth of 2.11 inches.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.015272 |
| $SO_x$ | 0.000293 |
| $NO_x$ | 0.082658 |
| CO | 0.112014 |
| PM 10 | 0.525466 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.003352 |
| Pb | 0.000000 |
| $NH_3$ | 0.000056 |
| $CO_2e$ | 27.9 |
| | |

### 4.1 Trenching/Excavating Phase

#### 4.1.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

#### 4.1.2 Trenching / Excavating Phase Assumptions

**- General Trenching/Excavating Information**

**Area of Site to be Trenched/Excavated ($ft^2$):** 79600
**Amount of Material to be Hauled On-Site ($yd^3$):** 1
**Amount of Material to be Hauled Off-Site ($yd^3$):** 648

**- Trenching Default Settings**

**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipment Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**

**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**

**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**4.1.3 Trenching / Excavating Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.569 | 000.008 | 000.606 | 005.120 | 000.008 | 000.007 | | 000.034 | 00381.013 |
| LDGT | 000.807 | 000.010 | 001.051 | 008.641 | 000.009 | 000.008 | | 000.034 | 00508.378 |
| HDGV | 001.513 | 000.016 | 002.777 | 026.893 | 000.020 | 000.018 | | 000.046 | 00789.086 |
| LDDV | 000.207 | 000.003 | 000.305 | 003.836 | 000.006 | 000.006 | | 000.008 | 00391.624 |
| LDDT | 000.520 | 000.005 | 000.815 | 007.812 | 000.008 | 000.008 | | 000.008 | 00609.856 |
| HDDV | 000.593 | 000.014 | 006.848 | 002.466 | 000.375 | 000.345 | | 000.026 | 01559.210 |
| MC | 002.959 | 000.008 | 000.696 | 014.613 | 000.026 | 000.023 | | 000.049 | 00391.464 |

**4.1.4 Trenching / Excavating Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**

$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# 5. Personnel

### 5.1 General Information & Timeline Assumptions

**- Add or Remove Activity from Baseline?** Add

**- Activity Location**
**County:** Honolulu
**Regulatory Area(s):** NOT IN A REGULATORY AREA

**- Activity Title:** SPCS #5 add 105 ANG personnel

**- Activity Description:**
SPCS #5 add 105 ANG personnel.

**- Activity Start Date**
**Start Month:** 1
**Start Year:** 2022

**- Activity End Date**
**Indefinite:** Yes
**End Month:** N/A
**End Year:** N/A

**- Activity Emissions:**

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| VOC | 0.185044 |
| $SO_x$ | 0.001265 |
| $NO_x$ | 0.152806 |
| CO | 2.200484 |
| PM 10 | 0.003174 |

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| PM 2.5 | 0.002864 |
| Pb | 0.000000 |
| $NH_3$ | 0.011625 |
| $CO_2e$ | 188.4 |
| | |

**5.2 Personnel Assumptions**

**- Number of Personnel**
**Active Duty Personnel:** 0
**Civilian Personnel:** 0
**Support Contractor Personnel:** 0
**Air National Guard (ANG) Personnel:** 105
**Reserve Personnel:** 0

**- Default Settings Used:** Yes

**- Average Personnel Round Trip Commute (mile):** 20 (default)

**- Personnel Work Schedule**
**Active Duty Personnel:** 5 Days Per Week (default)
**Civilian Personnel:** 5 Days Per Week (default)
**Support Contractor Personnel:** 5 Days Per Week (default)
**Air National Guard (ANG) Personnel:** 4 Days Per Week (default)
**Reserve Personnel:** 4 Days Per Month (default)

**5.3 Personnel On Road Vehicle Mixture**

**- On Road Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 37.55 | 60.32 | 0 | 0.03 | 0.2 | 0 | 1.9 |
| GOVs | 54.49 | 37.73 | 4.67 | 0 | 0 | 3.11 | 0 |

**5.4 Personnel Emission Factor(s)**

**- On Road Vehicle Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 000.280 | 000.002 | 000.208 | 003.467 | 000.005 | 000.005 | | 000.023 | 00332.267 |
| LDGT | 000.373 | 000.003 | 000.374 | 004.989 | 000.007 | 000.006 | | 000.024 | 00427.713 |
| HDGV | 000.801 | 000.005 | 000.972 | 016.626 | 000.015 | 000.013 | | 000.046 | 00789.621 |
| LDDV | 000.079 | 000.003 | 000.127 | 002.707 | 000.004 | 000.004 | | 000.008 | 00325.337 |
| LDDT | 000.218 | 000.004 | 000.362 | 004.629 | 000.007 | 000.006 | | 000.008 | 00461.106 |
| HDDV | 000.300 | 000.013 | 003.537 | 001.358 | 000.165 | 000.152 | | 000.026 | 01490.613 |
| MC | 002.824 | 000.003 | 000.676 | 013.057 | 000.025 | 000.023 | | 000.053 | 00392.231 |

**5.5 Personnel Formula(s)**

**- Personnel Vehicle Miles Travel for Work Days per Year**
$VMT_P = NP * WD * AC$

$VMT_P$: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

**- Total Vehicle Miles Travel per Year**
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

$VMT_{Total}$: Total Vehicle Miles Travel (miles)
$VMT_{AD}$: Active Duty Personnel Vehicle Miles Travel (miles)
$VMT_C$: Civilian Personnel Vehicle Miles Travel (miles)
$VMT_{SC}$: Support Contractor Personnel Vehicle Miles Travel (miles)
$VMT_{ANG}$: Air National Guard Personnel Vehicle Miles Travel (miles)
$VMT_{AFRC}$: Reserve Personnel Vehicle Miles Travel (miles)

**- Vehicle Emissions per Year**
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{Total}$: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# Alternative C: SPCS #4 Andersen AFB

## 1. General Information

**- Action Location**
**Base:** ANDERSEN AFB
**State:** Guam
**County(s):** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Tanguisson, GU; Piti-Cabras, GU

**- Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**- Project Number/s (if applicable):** Not Applicable

**- Projected Action Start Date:** 1 / 2022

**- Action Purpose and Need:**
The purpose of the Proposed Action is for the U.S. Air Force to provide the facilities and locations suitable for the establishment of two Air National Guard (ANG) Space Control Squadrons (SPCS) locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. SPCS #4 is needed in order to meet the 2015 AFSPC/CC ARC Initiative priority to generate four additional ANG unit-equipped UTCs to meet CCMD needs for offensive space control. SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet CCMD requirements for defensive space control.

**- Action Description:**
The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua‘i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O‘ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing an 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**- Point of Contact**
**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**- Activity List: Alternative C - SPCS #4 Andersen AFB**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | SPCS #4 construct 12,100 sf building. |
| 3. | Construction / Demolition | SPCS #4 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad. |
| 4. | Construction / Demolition | SPCS #4 construct 676 cubic yard infiltration basin |

| | | |
|---|---|---|
| 5. | Personnel | SPCS #4 add 115 ANG personnel |

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

**2.1 General Information & Timeline Assumptions**

**- Activity Location**
**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #4 construct 12,100 sf building.

**- Activity Description:**
Construct 12,100 sf building.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 12
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.304601 |
| $SO_x$ | 0.002760 |
| $NO_x$ | 0.778769 |
| CO | 1.316896 |
| PM 10 | 0.057443 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.029158 |
| Pb | 0.000000 |
| $NH_3$ | 0.003447 |
| $CO_2e$ | 248.9 |
| | |

**2.1 Site Grading Phase**

**2.1.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 5

**2.1.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 12100
**Amount of Material to be Hauled On-Site ($yd^3$):** 224

**Amount of Material to be Hauled Off-Site ($yd^3$):** 224

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

### 2.1.4 Site Grading Phase Formula(s)

**- Fugitive Dust Emissions per Phase**

$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**

$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

**2.2 Building Construction Phase**

**2.2.1 Building Construction Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 12
**Number of Days:** 0

**2.2.2 Building Construction Phase Assumptions**

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 12100
**Height of Building (ft):** 29.75
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cranes Composite | 1 | 4 |
| Forklifts Composite | 2 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40 (default)

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**2.2.3 Building Construction Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Cranes Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0797 | 0.0013 | 0.5505 | 0.3821 | 0.0203 | 0.0203 | 0.0071 | 128.81 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **Pb** | **$NH_3$** | **$CO_2e$** |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**2.2.4 Building Construction Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**

$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE}$ = BA * BH * (0.42 / 1000) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**2.3 Architectural Coatings Phase**

**2.3.1 Architectural Coatings Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**2.3.2 Architectural Coatings Phase Assumptions**

**- General Architectural Coatings Information**
**Building Category:** Non-Residential
**Total Square Footage ($ft^2$):** 13090
**Number of Units:** N/A

**- Architectural Coatings Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.3.3 Architectural Coatings Phase Emission Factor(s)**

**- Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**2.3.4 Architectural Coatings Phase Formula(s)**

**- Worker Trips Emissions per Phase**
$VMT_{WT} = (1 * WT * PA) / 800$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area ($ft^2$)
800: Conversion Factor square feet to man days (1 $ft^2$ / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

$VOC_{AC}$: Architectural Coating VOC Emissions (TONs)
BA: Area of Building ($ft^2$)
2.0: Conversion Factor total area to coated area (2.0 $ft^2$ coated area / total area)
0.0116: Emission Factor (lb/$ft^2$)
2000: Conversion Factor pounds to tons

## 3. Construction / Demolition

**3.1 General Information & Timeline Assumptions**

**- Activity Location**

**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #4 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Description:**
Construct 2,500 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.022037 |
| $SO_x$ | 0.000281 |
| $NO_x$ | 0.103905 |
| CO | 0.160741 |
| PM 10 | 0.226406 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.004953 |
| Pb | 0.000000 |
| $NH_3$ | 0.000570 |
| $CO_2e$ | 25.1 |
| | |

**3.1 Site Grading Phase**

**3.1.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**3.1.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 67500
**Amount of Material to be Hauled On-Site ($yd^3$):** 1250
**Amount of Material to be Hauled Off-Site ($yd^3$):** 1250

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**3.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| **Graders Composite** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**3.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 3.2 Paving Phase

#### 3.2.1 Paving Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0

**Number of Days:** 10

**3.2.2 Paving Phase Assumptions**

**- General Paving Information**
**Paving Area ($ft^2$):** 67500

**- Paving Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cement and Mortar Mixers Composite | 4 | 6 |
| Pavers Composite | 1 | 7 |
| Paving Equipment Composite | 2 | 6 |
| Rollers Composite | 1 | 7 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**3.2.3 Paving Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**3.2.4 Paving Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE}$ = PA * 0.25 * (1 / 27) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area ($ft^2$)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**

$VOC_P = (2.62 * PA) / 43560$

$VOC_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area ($ft^2$)
43560: Conversion Factor square feet to acre ($(43560\ ft2 / acre)^2$ / acre)

# 4. Construction / Demolition

**4.1 General Information & Timeline Assumptions**

**- Activity Location**
**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #4 construct 676 cubic yard infiltration basin

**- Activity Description:**
Construct 676 cubic yard infiltration basin to contain runoff from new impervious surfaces using 95th percentile design rainfall depth of 2.20 inches.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.016012 |
| $SO_x$ | 0.000301 |
| $NO_x$ | 0.080876 |
| CO | 0.128463 |
| PM 10 | 0.525403 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.003267 |
| Pb | 0.000000 |
| $NH_3$ | 0.000221 |
| $CO_2e$ | 27.4 |
| | |

**4.1 Trenching/Excavating Phase**

**4.1.1 Trenching / Excavating Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

**4.1.2 Trenching / Excavating Phase Assumptions**

**- General Trenching/Excavating Information**

**Area of Site to be Trenched/Excavated ($ft^2$):** 79600
**Amount of Material to be Hauled On-Site ($yd^3$):** 1
**Amount of Material to be Hauled Off-Site ($yd^3$):** 676

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipment Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**4.1.3 Trenching / Excavating Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| LDGT | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| HDGV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| LDDV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| LDDT | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| HDDV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| MC | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |

**4.1.4 Trenching / Excavating Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 5. Personnel

### 5.1 General Information & Timeline Assumptions

**- Add or Remove Activity from Baseline?** Add

**- Activity Location**

**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #4 add 115 ANG personnel

**- Activity Description:**
SPCS #4 add 115 ANG personnel.

**- Activity Start Date**
**Start Month:** 1
**Start Year:** 2022

**- Activity End Date**
**Indefinite:** Yes
**End Month:** N/A
**End Year:** N/A

**- Activity Emissions:**

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| VOC | 0.333867 |
| $SO_x$ | 0.004747 |
| $NO_x$ | 0.274267 |
| CO | 5.471094 |
| PM 10 | 0.014768 |

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| PM 2.5 | 0.007384 |
| Pb | 0.000000 |
| $NH_3$ | 0.050106 |
| $CO_2e$ | 264.1 |
| | |

**5.2 Personnel Assumptions**

**- Number of Personnel**
**Active Duty Personnel:** 0
**Civilian Personnel:** 0
**Support Contractor Personnel:** 0
**Air National Guard (ANG) Personnel:** 115
**Reserve Personnel:** 0

**- Default Settings Used:** Yes

**- Average Personnel Round Trip Commute (mile):** 20 (default)

**- Personnel Work Schedule**
**Active Duty Personnel:** 5 Days Per Week (default)
**Civilian Personnel:** 5 Days Per Week (default)
**Support Contractor Personnel:** 5 Days Per Week (default)
**Air National Guard (ANG) Personnel:** 4 Days Per Week (default)
**Reserve Personnel:** 4 Days Per Month (default)

**5.3 Personnel On Road Vehicle Mixture**

**- On Road Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 37.55 | 60.32 | 0 | 0.03 | 0.2 | 0 | 1.9 |
| GOVs | 54.49 | 37.73 | 4.67 | 0 | 0 | 3.11 | 0 |

**5.4 Personnel Emission Factor(s)**

**- On Road Vehicle Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**5.5 Personnel Formula(s)**

**- Personnel Vehicle Miles Travel for Work Days per Year**
$VMT_P = NP * WD * AC$

$VMT_P$: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

**- Total Vehicle Miles Travel per Year**
$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

$VMT_{Total}$: Total Vehicle Miles Travel (miles)
$VMT_{AD}$: Active Duty Personnel Vehicle Miles Travel (miles)
$VMT_C$: Civilian Personnel Vehicle Miles Travel (miles)
$VMT_{SC}$: Support Contractor Personnel Vehicle Miles Travel (miles)
$VMT_{ANG}$: Air National Guard Personnel Vehicle Miles Travel (miles)
$VMT_{AFRC}$: Reserve Personnel Vehicle Miles Travel (miles)

**- Vehicle Emissions per Year**
$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{Total}$: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

# Alternative C: SPCS #5 Andersen AFB

## 1. General Information

**- Action Location**

**Base:** ANDERSEN AFB
**State:** Guam
**County(s):** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Tanguisson, GU; Piti-Cabras, GU

**- Action Title:** Space Control Squadron (SPCS) Beddown for the Fourth (SPCS #4) and Fifth (SPCS #5) Basing Actions Pacific Missile Range Facility – Barking Sands, Hawaii; Joint Base Pearl Harbor – Hickam, Hawaii; Andersen Air Force Base, Guam

**- Project Number/s (if applicable):** Not Applicable

**- Projected Action Start Date:** 1 / 2022

**- Action Purpose and Need:**

The purpose of the Proposed Action is for the U.S. Air Force to provide the facilities and locations suitable for the establishment of two Air National Guard (ANG) Space Control Squadrons (SPCS) locations with access to geosynchronous satellites in the Pacific theater, which would consist of one offensive mission and one defensive mission. SPCS #4 is needed in order to meet the 2015 AFSPC/CC ARC Initiative priority to generate four additional ANG unit-equipped UTCs to meet CCMD needs for offensive space control. SPCS #5 is needed in order to meet the 2018 AFSPC/CC ARC Priority Memorandum to generate eight ANG unit-equipped UTCs to meet CCMD requirements for defensive space control.

**- Action Description:**

The Air Force is proposing to establish two ANG SPCSs. The first ANG SPCS, SPCS #4 (offensive mission), would be located at one of three candidate locations: JBPHH, HI; PMRF - Barking Sands, HI; or Andersen AFB, Guam. The second ANG SPCS, SPCS #5 (defensive mission), would be located at one of three candidate locations as identified above. Three alternatives are being considered: Alternative A considers beddown for SPCS #4 and SPCS #5 basing actions at PMRF-Barking Sands, Kaua‘i, Hawaii; Alternative B considers beddown for SPCS #4 and SPCS #5 basing actions at JBPHH, O‘ahu, Hawaii; and Alternative C considers beddown for SPCS #4 and SPCS #5 basing actions at Andersen AFB, Guam. Alternative A would require: renovating 11,217 sf of an existing building and constructing an 813 sf addition to the existing building; and constructing a 5,000 sy equipment pad, 2,500 sy parking lot, and an infiltration basin. Alternatives B and C would require the construction a 12,100 sf building; 5,000 sy equipment pad 2,500 sy parking lot; and an infiltration basin. Each alternative would require the beddown of additional personnel. SPCS #4 would require between 88 and 115 new ANG personnel in support of an offensive mission, and SPCS #5 would require the addition of between 62 and 105 ANG personnel in support of a defensive mission.

**- Point of Contact**

**Name:** Drea Traeumer
**Title:** Environmental Scientist
**Organization:** Environmental Assessment Services
**Email:** drea.traeumer@easbio.com
**Phone Number:** 775.750.0472

**- Activity List: Alternative C - SPCS #5 Andersen AFB**

| Activity Type | | Activity Title |
|---|---|---|
| 2. | Construction / Demolition | SPCS #5 construct 12,100 sf building. |
| 3. | Construction / Demolition | SPCS #5 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad. |
| 4. | Construction / Demolition | SPCS #5 construct 676 cubic yard infiltration basin |

| | | |
|---|---|---|
| 5. | Personnel | SPCS #5 add 105 ANG personnel |

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

## 2. Construction / Demolition

**2.1 General Information & Timeline Assumptions**

**- Activity Location**
**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #5 construct 12,100 sf building.

**- Activity Description:**
Construct 12,100 sf building.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 12
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.304601 |
| $SO_x$ | 0.002760 |
| $NO_x$ | 0.778769 |
| CO | 1.316896 |
| PM 10 | 0.057443 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.029158 |
| Pb | 0.000000 |
| $NH_3$ | 0.003447 |
| $CO_2e$ | 248.9 |
| | |

**2.1 Site Grading Phase**

**2.1.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 5

**2.1.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 12100
**Amount of Material to be Hauled On-Site ($yd^3$):** 224

**Amount of Material to be Hauled Off-Site ($yd^3$):** 224

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**2.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE}$ = ($HA_{OnSite}$ + $HA_{OffSite}$) * (1 / HC) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL}$ = ($VMT_{WT}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

**2.2 Building Construction Phase**

**2.2.1 Building Construction Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 12
**Number of Days:** 0

**2.2.2 Building Construction Phase Assumptions**

**- General Building Construction Information**
**Building Category:** Office or Industrial
**Area of Building ($ft^2$):** 12100
**Height of Building (ft):** 29.75
**Number of Units:** N/A

**- Building Construction Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cranes Composite | 1 | 4 |
| Forklifts Composite | 2 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**- Vendor Trips**
**Average Vendor Round Trip Commute (mile):** 40 (default)

**- Vendor Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**2.2.3 Building Construction Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Cranes Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0797 | 0.0013 | 0.5505 | 0.3821 | 0.0203 | 0.0203 | 0.0071 | 128.81 |
| **Forklifts Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0274 | 0.0006 | 0.1265 | 0.2146 | 0.0043 | 0.0043 | 0.0024 | 54.457 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | **VOC** | **$SO_x$** | **$NO_x$** | **CO** | **PM 10** | **PM 2.5** | **$CH_4$** | **$CO_2e$** |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**2.2.4 Building Construction Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**

$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**

$VMT_{VE}$ = BA * BH * (0.42 / 1000) * HT

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.42 / 1000): Conversion Factor $ft^3$ to trips (0.42 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL}$ = ($VMT_{VE}$ * 0.002205 * $EF_{POL}$ * VM) / 2000

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**

$VMT_{WT}$ = WD * WT * 1.25 * NE

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Vender Trips Emissions per Phase**
$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$

$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
BA: Area of Building ($ft^2$)
BH: Height of Building (ft)
(0.38 / 1000): Conversion Factor $ft^3$ to trips (0.38 trip / 1000 $ft^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VT}$: Vender Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**2.3 Architectural Coatings Phase**

**2.3.1 Architectural Coatings Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**2.3.2 Architectural Coatings Phase Assumptions**

**- General Architectural Coatings Information**
**Building Category:** Non-Residential
**Total Square Footage ($ft^2$):** 13090
**Number of Units:** N/A

**- Architectural Coatings Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**2.3.3 Architectural Coatings Phase Emission Factor(s)**

**- Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**2.3.4 Architectural Coatings Phase Formula(s)**

**- Worker Trips Emissions per Phase**
$VMT_{WT} = (1 * WT * PA) / 800$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
1: Conversion Factor man days to trips (1 trip / 1 man * day)
WT: Average Worker Round Trip Commute (mile)
PA: Paint Area ($ft^2$)
800: Conversion Factor square feet to man days (1 $ft^2$ / 1 man * day)

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**
$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$

$VOC_{AC}$: Architectural Coating VOC Emissions (TONs)
BA: Area of Building ($ft^2$)
2.0: Conversion Factor total area to coated area (2.0 $ft^2$ coated area / total area)
0.0116: Emission Factor ($lb/ft^2$)
2000: Conversion Factor pounds to tons

# 3. Construction / Demolition

**3.1 General Information & Timeline Assumptions**

**- Activity Location**

**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #5 construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Description:**
Construct 2,400 sy asphalt parking lot and 5,000 sy concrete equipment pad.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.022037 |
| $SO_x$ | 0.000281 |
| $NO_x$ | 0.103905 |
| CO | 0.160741 |
| PM 10 | 0.226406 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.004953 |
| Pb | 0.000000 |
| $NH_3$ | 0.000570 |
| $CO_2e$ | 25.1 |
| | |

**3.1 Site Grading Phase**

**3.1.1 Site Grading Phase Timeline Assumptions**

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 10

**3.1.2 Site Grading Phase Assumptions**

**- General Site Grading Information**
**Area of Site to be Graded ($ft^2$):** 67500
**Amount of Material to be Hauled On-Site ($yd^3$):** 1250
**Amount of Material to be Hauled Off-Site ($yd^3$):** 1250

**- Site Grading Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Graders Composite | 1 | 6 |
| Other Construction Equipment Composite | 1 | 8 |
| Rubber Tired Dozers Composite | 1 | 6 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**3.1.3 Site Grading Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**3.1.4 Site Grading Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD}$ = (20 * ACRE * WD) / 2000

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL}$ = (NE * WD * H * $EF_{POL}$) / 2000

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

### 3.2 Paving Phase

#### 3.2.1 Paving Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0

**Number of Days:** 10

### 3.2.2 Paving Phase Assumptions

**- General Paving Information**
**Paving Area ($ft^2$):** 67500

**- Paving Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Cement and Mortar Mixers Composite | 4 | 6 |
| Pavers Composite | 1 | 7 |
| Paving Equipment Composite | 2 | 6 |
| Rollers Composite | 1 | 7 |
| Tractors/Loaders/Backhoes Composite | 1 | 7 |

**- Vehicle Exhaust**
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

### 3.2.3 Paving Phase Emission Factor(s)

**- Construction Exhaust Emission Factors (lb/hour) (default)**

| Graders Composite | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0806 | 0.0014 | 0.4657 | 0.5731 | 0.0217 | 0.0217 | 0.0072 | 132.92 |
| **Other Construction Equipment Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0507 | 0.0012 | 0.2785 | 0.3488 | 0.0105 | 0.0105 | 0.0045 | 122.61 |
| **Rubber Tired Dozers Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.1919 | 0.0024 | 1.3611 | 0.7352 | 0.0536 | 0.0536 | 0.0173 | 239.51 |
| **Tractors/Loaders/Backhoes Composite** | | | | | | | | |
| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | $CH_4$ | $CO_2e$ |
| Emission Factors | 0.0383 | 0.0007 | 0.2301 | 0.3598 | 0.0095 | 0.0095 | 0.0034 | 66.884 |

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**3.2.4 Paving Phase Formula(s)**

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
PA: Paving Area ($ft^2$)
0.25: Thickness of Paving Area (ft)
(1 / 27): Conversion Factor cubic feet to cubic yards (1 $yd^3$ / 27 $ft^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Off-Gassing Emissions per Phase**

$VOC_P = (2.62 * PA) / 43560$

$VOC_P$: Paving VOC Emissions (TONs)
2.62: Emission Factor (lb/acre)
PA: Paving Area ($ft^2$)
43560: Conversion Factor square feet to acre ($43560\ ft2 / acre)^2$ / acre)

## 4. Construction / Demolition

### 4.1 General Information & Timeline Assumptions

**- Activity Location**
**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #5 construct 676 cubic yard infiltration basin

**- Activity Description:**
Construct 676 cubic yard infiltration basin to contain runoff from new impervious surfaces using 95th percentile design rainfall depth of 2.20 inches.

**- Activity Start Date**
**Start Month:** 1
**Start Month:** 2022

**- Activity End Date**
**Indefinite:** False
**End Month:** 1
**End Month:** 2022

**- Activity Emissions:**

| Pollutant | Total Emissions (TONs) |
|---|---|
| VOC | 0.015993 |
| $SO_x$ | 0.000301 |
| $NO_x$ | 0.080860 |
| CO | 0.128142 |
| PM 10 | 0.525403 |

| Pollutant | Total Emissions (TONs) |
|---|---|
| PM 2.5 | 0.003266 |
| Pb | 0.000000 |
| $NH_3$ | 0.000218 |
| $CO_2e$ | 27.4 |
| | |

### 4.1 Trenching/Excavating Phase

#### 4.1.1 Trenching / Excavating Phase Timeline Assumptions

**- Phase Start Date**
**Start Month:** 1
**Start Quarter:** 1
**Start Year:** 2022

**- Phase Duration**
**Number of Month:** 0
**Number of Days:** 20

#### 4.1.2 Trenching / Excavating Phase Assumptions

**- General Trenching/Excavating Information**

**Area of Site to be Trenched/Excavated ($ft^2$):** 79600
**Amount of Material to be Hauled On-Site ($yd^3$):** 1
**Amount of Material to be Hauled Off-Site ($yd^3$):** 648

**- Trenching Default Settings**
**Default Settings Used:** Yes
**Average Day(s) worked per week:** 5 (default)

**- Construction Exhaust (default)**

| Equipment Name | Number Of Equipment | Hours Per Day |
|---|---|---|
| Excavators Composite | 2 | 8 |
| Other General Industrial Equipment Composite | 1 | 8 |
| Tractors/Loaders/Backhoes Composite | 1 | 8 |

**- Vehicle Exhaust**
**Average Hauling Truck Capacity ($yd^3$):** 20 (default)
**Average Hauling Truck Round Trip Commute (mile):** 20 (default)

**- Vehicle Exhaust Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 0 | 0 | 0 | 0 | 0 | 100.00 | 0 |

**- Worker Trips**
**Average Worker Round Trip Commute (mile):** 20 (default)

**- Worker Trips Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 50.00 | 50.00 | 0 | 0 | 0 | 0 | 0 |

**4.1.3 Trenching / Excavating Phase Emission Factor(s)**

**- Construction Exhaust Emission Factors (lb/hour) (default)**

**- Vehicle Exhaust & Worker Trips Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| LDGT | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| HDGV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| LDDV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| LDDT | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| HDDV | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |
| MC | 00.7810 | 00.0090 | 00.7260 | 11.5710 | 00.0300 | 00.0160 | | 00.0950 | 00495.600 |

**4.1.4 Trenching / Excavating Phase Formula(s)**

**- Fugitive Dust Emissions per Phase**
$PM10_{FD} = (20 * ACRE * WD) / 2000$

$PM10_{FD}$: Fugitive Dust PM 10 Emissions (TONs)
20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
ACRE: Total acres (acres)
WD: Number of Total Work Days (days)
2000: Conversion Factor pounds to tons

**- Construction Exhaust Emissions per Phase**
$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$

$CEE_{POL}$: Construction Exhaust Emissions (TONs)
NE: Number of Equipment
WD: Number of Total Work Days (days)
H: Hours Worked per Day (hours)
$EF_{POL}$: Emission Factor for Pollutant (lb/hour)
2000: Conversion Factor pounds to tons

**- Vehicle Exhaust Emissions per Phase**
$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$

$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
$HA_{OnSite}$: Amount of Material to be Hauled On-Site ($yd^3$)
$HA_{OffSite}$: Amount of Material to be Hauled Off-Site ($yd^3$)
HC: Average Hauling Truck Capacity ($yd^3$)
(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC $yd^3$)
HT: Average Hauling Truck Round Trip Commute (mile/trip)

$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Vehicle Exhaust Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Vehicle Exhaust On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

**- Worker Trips Emissions per Phase**
$VMT_{WT} = WD * WT * 1.25 * NE$

$VMT_{WT}$: Worker Trips Vehicle Miles Travel (miles)
WD: Number of Total Work Days (days)
WT: Average Worker Round Trip Commute (mile)
1.25: Conversion Factor Number of Construction Equipment to Number of Works
NE: Number of Construction Equipment

$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{VE}$: Worker Trips Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Worker Trips On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons

## 5. Personnel

### 5.1 General Information & Timeline Assumptions

**- Add or Remove Activity from Baseline?** Add

**- Activity Location**

**County:** Guam
**Regulatory Area(s):** NOT IN A REGULATORY AREA; Piti, GU; Piti-Cabras, GU; Tanguisson, GU

**- Activity Title:** SPCS #5 add 105 ANG personnel

**- Activity Description:**
SPCS #5 add 105 ANG personnel.

**- Activity Start Date**
**Start Month:** 1
**Start Year:** 2022

**- Activity End Date**
**Indefinite:** Yes
**End Month:** N/A
**End Year:** N/A

**- Activity Emissions:**

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| VOC | 0.304835 |
| $SO_x$ | 0.004334 |
| $NO_x$ | 0.250417 |
| CO | 4.995346 |
| PM 10 | 0.013484 |

| Pollutant | Emissions Per Year (TONs) |
|---|---|
| PM 2.5 | 0.006742 |
| Pb | 0.000000 |
| $NH_3$ | 0.045749 |
| $CO_2e$ | 241.2 |
| | |

**5.2 Personnel Assumptions**

**- Number of Personnel**
**Active Duty Personnel:** 0
**Civilian Personnel:** 0
**Support Contractor Personnel:** 0
**Air National Guard (ANG) Personnel:** 105
**Reserve Personnel:** 0

**- Default Settings Used:** Yes

**- Average Personnel Round Trip Commute (mile):** 20 (default)

**- Personnel Work Schedule**
**Active Duty Personnel:** 5 Days Per Week (default)
**Civilian Personnel:** 5 Days Per Week (default)
**Support Contractor Personnel:** 5 Days Per Week (default)
**Air National Guard (ANG) Personnel:** 4 Days Per Week (default)
**Reserve Personnel:** 4 Days Per Month (default)

**5.3 Personnel On Road Vehicle Mixture**

**- On Road Vehicle Mixture (%)**

| | LDGV | LDGT | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|
| POVs | 37.55 | 60.32 | 0 | 0.03 | 0.2 | 0 | 1.9 |
| GOVs | 54.49 | 37.73 | 4.67 | 0 | 0 | 3.11 | 0 |

**5.4 Personnel Emission Factor(s)**

**- On Road Vehicle Emission Factors (grams/mile)**

| | VOC | $SO_x$ | $NO_x$ | CO | PM 10 | PM 2.5 | Pb | $NH_3$ | $CO_2e$ |
|---|---|---|---|---|---|---|---|---|---|
| LDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDGT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDGV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| LDDT | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| HDDV | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |
| MC | 00.6330 | 00.0090 | 00.5200 | 10.3730 | 00.0280 | 00.0140 | | 00.0950 | 00500.800 |

**5.5 Personnel Formula(s)**

**- Personnel Vehicle Miles Travel for Work Days per Year**

$VMT_P = NP * WD * AC$

$VMT_P$: Personnel Vehicle Miles Travel (miles/year)
NP: Number of Personnel
WD: Work Days per Year
AC: Average Commute (miles)

**- Total Vehicle Miles Travel per Year**

$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$

$VMT_{Total}$: Total Vehicle Miles Travel (miles)
$VMT_{AD}$: Active Duty Personnel Vehicle Miles Travel (miles)
$VMT_C$: Civilian Personnel Vehicle Miles Travel (miles)
$VMT_{SC}$: Support Contractor Personnel Vehicle Miles Travel (miles)
$VMT_{ANG}$: Air National Guard Personnel Vehicle Miles Travel (miles)
$VMT_{AFRC}$: Reserve Personnel Vehicle Miles Travel (miles)

**- Vehicle Emissions per Year**

$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$

$V_{POL}$: Vehicle Emissions (TONs)
$VMT_{Total}$: Total Vehicle Miles Travel (miles)
0.002205: Conversion Factor grams to pounds
$EF_{POL}$: Emission Factor for Pollutant (grams/mile)
VM: Personnel On Road Vehicle Mixture (%)
2000: Conversion Factor pounds to tons